

COAL AGE

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THE anthracite mines in Pennsylvania are practically the only important collieries in the world that are operated under a system where the state inspectors are selected by popular vote instead of appointment. The latter plan was abolished in 1901 when the Pennsylvania Legislature amended the anthracite law in compliance with the demands of the miners.

The present statutes, like those formerly in force, provide that no man is eligible to serve as an inspector until he has answered ninety per cent. of the questions propounded at a specially authorized examination. Nominations for party election, therefore, have to be made from among those who have successfully qualified for the position.

The former system, based on selection by appointment, was not perfect, but when compared with the present vicious practice, founded on the uncertain whims of temporary political fancy, it was as the sublimity of virtue contrasted with the evil of vice.

In seeking the change, the miners were led to believe that their interests and safety would be better guarded if inspectors were elected. It was asserted to them that the new scheme would eliminate corporation control of the men chosen, and that the proposed plan would open the way to quicker advancement for ambitious miners.

The plain truth is that the standard of mine inspection in the anthracite field has been lowered. What was intended to be a remedy has proved nothing less than a worse disease. The dignity of the office has been reduced and efficiency and independence largely destroyed.

Under the present plan, the inspector must cater to the wishes of political leaders. He is often made the instrument of retaliation, and at times is obliged to leave his post of duty, and precipitate himself into the midst of a political campaign, spending weeks in electioneering and thus neglecting the work for which the state pays him.

Furthermore, the perniciousness of such an election system doesn't end with inefficient colliery inspection; it extends to the actual operation of the mines, in that it has a direct bearing on the selection of mine foremen and firebosses. The inspector is a member of the examining board, and recent cases have occurred where candidates unqualified in training, but possessing political influence, have secured foreman and fireboss certificates when all facts argued their incompetency.

Interested parties backed by certain papers have

recently suggested a still further step toward the complete demoralization of the anthracite inspection service. They advocate that all mine foremen be made eligible for election as inspectors, and recommend the abolition of the present system whereby only candidates who have successfully passed an examination, are permitted to go on the ballot.

In addition to all that has just been stated, the present method of choosing the inspectors is unfair. Instead of the voters in a certain district electing their own inspector, the people (including farmers and tradesmen) in another nearby district, vote for the candidate who aspires to serve at mines in which they have no interest or acquaintance.

Laws are of no avail unless they are enforced. If the public approves an inspection system that encourages laxity in the observance of vital legislation, then the people, or rather their representative, the state government, should assume responsibility in case of accidents.

Last year in New York City, there were 35,000 burglaries—how many more were not reported we hesitate to guess. This record of crime, which in comparison, makes Hell's Kitchen, Arizona, look like a Sunday meeting of the Y. M. C. A., was caused by corrupt politics. Each man from the top official down to the lowliest patrolman is so busy "getting his" he hasn't any time to do duty as a policeman.

In contrast, look at our fire departments. Here "big business" has stepped in and declared: "We can't have fires; millions in property are at stake." What is the result? Efficiency, courage and an "always on the job" spirit pervade the service. Politics hasn't been permitted to embrace the department in its deadly clasp, and the men are seldom changed. By years of service they become experts in execution and models in obedience. Start to a New York fire and ten to one you will meet the engines coming back.

Why is it we view the safety of life in our anthracite collieries with less concern than we do property values? And why do the men themselves, who are most vitally concerned, permit self-interested leaders to hoodwink them into advocating and supporting a system fraught with danger to mines and men? Let us have any system, where the candidates are examined and appointed by the governor in the order of merit, rather than the present practice, where an inspector is liable to be ousted just when he has become familiar with his properties, and is prepared to be of maximum service to all concerned.

What do our readers think about this question?

Mining Methods in Illinois

By M. F. Peltier*

The Williamson County coal field or, as it is better known, the Carterville Bed, underlies the whole north half of the county and is found at different depths up to 200 ft. This field belongs to the Eastern Interior Coal Field, and the seam is designated by the Geological Survey of Illinois as the No. 7 seam. The thickness is from 8 to 9 ft. throughout the developed portions of the seam.

The salient feature of the field is an elongated basin, toward which the strata dip from every direction. The highest portion of the basin is in the southern part of the county. The coal outcrops about 1½ miles north of the city of Marion. The central part of the field is disturbed by a sharp fold or fault, with a down-throw of several feet. This fault extends from the outcrop in a northerly

A general description of one of the most important fields in Illinois. The equipment of the plants is modern in every respect and large tonnages are produced. The mines are mostly shaft openings, but comparatively shallow.

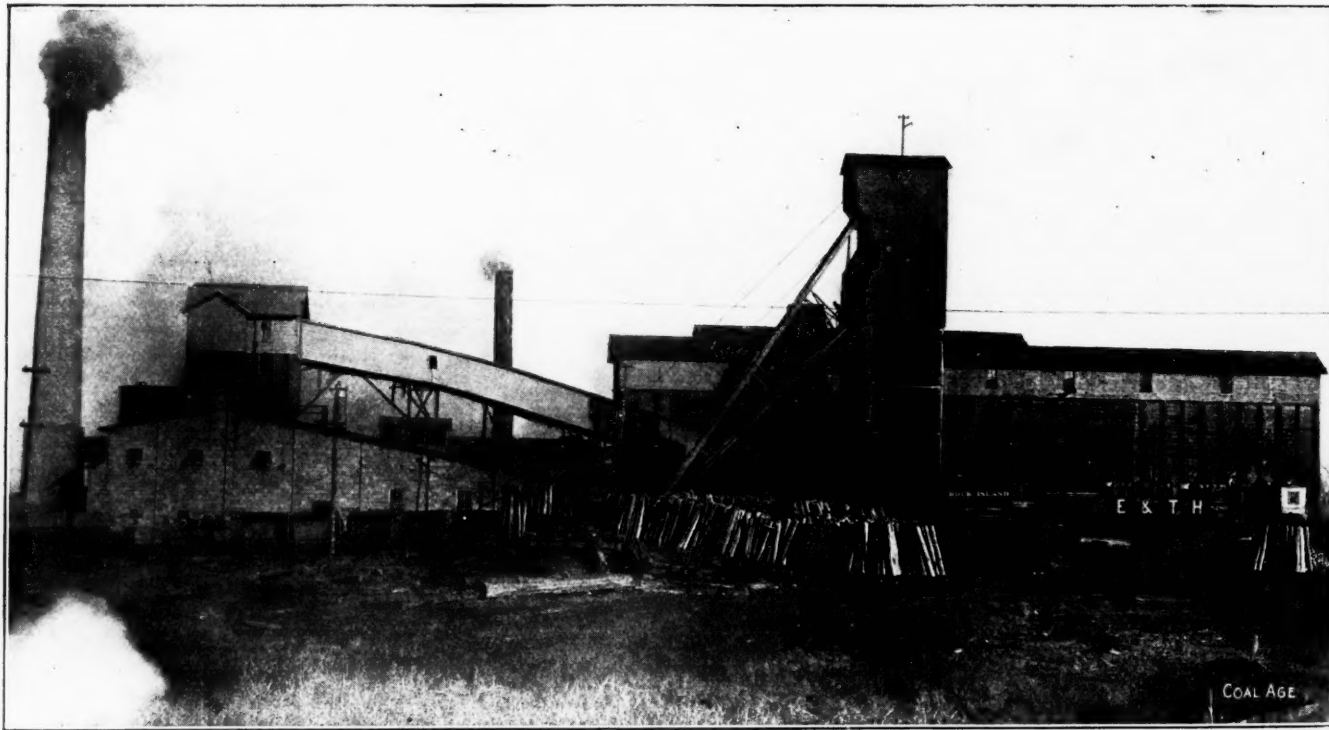
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This coal was used only for smithing purposes, wood being so abundant at that time that coal was not used for fuel. It was hauled by wagons to Franklin, Saline and Jefferson Counties for the

The first railroad built in the county was known as the Carbondale & Shawneetown R.R., and extended from Carbondale to Marion, a distance of about 18 miles. This road was completed on Jan. 20, 1872, at Marion, and later was extended to Paducah, Ky. The road changed hands several times and was finally taken over by the Illinois Central R.R., the building of which caused considerable activity in coal mining in this region.

PRODUCTION AND QUALITY OF THE COAL

The Carterville bed is remarkable, not only for its variations in quality and thickness, but also because it is free from horsebacks, slips and other irregularities, encountered in other fields. This and the Franklin County field are considered the



SURFACE PLANT AT THE PEABODY COAL CO.'S MINE NO. 3, MARION, ILL.

direction, and crosses the property of the Chicago & Big Muddy Coal Co. near their main shaft. The displacement at this point is nearly 50 ft., which necessitates using an incline to handle the coal.

HISTORICAL

The exact date of the discovery of coal in Williamson County is not known, but as early as 1850 coal was mined on the farm of Elijah Spiller, at Spillertown. The methods employed in mining, those days, were primitive. The coal having a light cover, they usually sunk a shaft about 8x10 ft., and mined out only a small portion within easy reach, abandoned the shaft, and sunk another.

leading blacksmiths, and was known as the Famous Peacock Smithing Coal, on account of its peculiar formation and beautiful coloring effects.

The first incorporated company and shipping mine was formed in 1872 at Carterville, and was known as the Carbondale Coal & Coke Co. This mine was operated as a slope and very primitive methods of mining were employed. The mining was all done by hand, powder or other explosives not being used; only screened coal was marketed, the slack and dust being left in the mine. The Herrin field was opened up in 1896, the Big Muddy Coal & Iron Co. being the first to operate a mine in this district.

most important in the state. The coal shows a calorific value as high as 13,000 B.t.u. The following analysis of a sample from the Peabody Coal Co.'s Mine No. 3, at Marion, may be taken as typical of the field as a whole:

Moisture	5.70
Fixed carbon	55.31
Volatile combustible	32.00
Ash	5.91
Sulphur	1.08

Williamson County is the largest producing county in the state, and according to the Illinois Coal Report produced 5,908,544 tons of coal last year; this is considered a remarkable record, in view of the fact that the average number of working days during the year was only

161. This reduction in work at the mines was caused chiefly by the delay in the operators and miners reaching an agreement upon a wage scale because of which mining was suspended from Apr. 1 until Sept. 10, 1910.

There are 38 shipping mines in the county and 17 small local mines. Williamson County has advantages over other mining districts, in regard to transportation, having six large railroads traversing it, which not only insure a good supply of cars, but give the operators an unlimited market for their product.

SYSTEM OF WORKING

A general uniformity in mining methods prevails throughout the county, with

are left between entries. Rooms are turned off the stub entries at right angles on 34-ft. centers and driven 250 ft.; they are 20 ft. wide, have 14-ft. pillars, and crosscuts every 60 ft., as prescribed by the state mining law. The main and side entries are protected by a barrier pillar from 50 to 100 ft. in thickness.

Pillars are not drawn in this field, but when a room is completed a start is made from the face and a slab taken off along the rib, leaving only a thin pillar to support the roof. Complete robbing of the pillars has not been very successful, owing to the thin covering and weak roof; when there is a large space left open it generally caves to the surface, giving considerable trouble, due to surface water.

used to collect the water from the workings near the coal face and deliver it to a large sump, which is generally located at some convenient place near the shaft bottom; from here the water is thrown to the surface by a single large pump. There are a great many different types of pumps used, the electric being one of the favorites for inside work.

The mining conditions in general are quite favorable for both picks and machines. In the pick mines, the coal in the rooms is all blasted from the solid with black powder. The entries are cut or sheared in the center by the miner, who uses a light short pick for that purpose. The cutting is made from 8 to 10 ft. long, and only sufficiently wide to admit the miner.



AN UNDERGROUND SCENE AT THE PEABODY COAL CO.'S NO. 3 MINE

the exception of slight modifications which are rendered necessary where the seam dips from 2 to 3 per cent.; then the main entries follow the dip and the side, or stub, entries are turned off at angles to secure easy haulage and drainage. The room-and-pillar system is universally used throughout the entire field. The mines are nearly all opened by shafts, although there are a few local mines opened by drifts where the position of the outcrop renders it possible.

The majority of the mines are laid off in panels. The main and stub entries are driven 12 ft. wide and 20-ft. pillars

The roof throughout the different mines is considered only fair; the majority of the operators leave a portion of the top coal in the entries to support the roof and when this gives way immediate timbering is necessary to secure the slate above it. At the main landings, near the shaft bottoms, the roof is supported with steel I-beams on masonry walls, or heavy white-oak posts. The rooms are all timbered with a double row of posts spaced at least 6 ft. apart.

WATER PROBLEMS AND MINING METHODS

Most all the mines have considerable water to contend with. Small pumps are

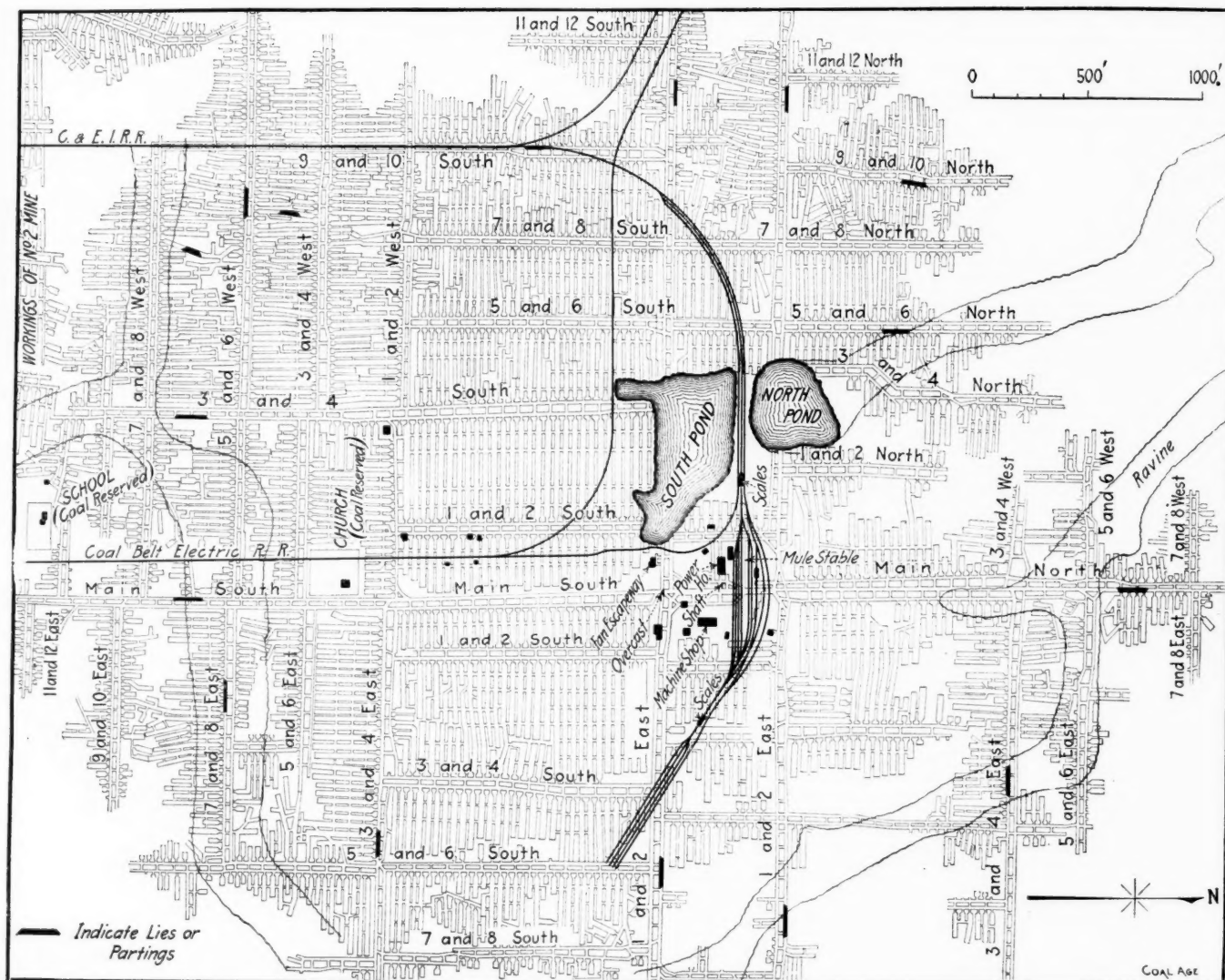
In the machine mines the undercutting is done in the bottom coal, both in rooms and entries. The electric chain breast machine seems to be preferred, although there are a great many punching machines used, which are operated by compressed air. Over 33 per cent. of the entire tonnage was cut by machines in Williamson County last year, notwithstanding the unfavorable machine mining rate, there being a differential of only 7c. per ton between machine and pick mining. The pick miner receives 54c. per ton of mine-run while the machine runner, helper and loader receive a total of 47c. per ton.

The holes for blasting are drilled with the usual hand drills; the depth of the holes depends entirely on the length of the cutting. The amount of powder used is measured by the number of inches in the length of the cartridge; a 2-in. cartridge, which is generally used, contains a little over one pound to the foot. The miners are not very particular in regard to the amount of powder they use, as they are paid on a mine-run basis, and

in case of accidents or fires. The telephones are used, not only for communicating in cases of threatened danger, but also in the general operations of the mines.

There are two different kinds of haulage in common use in the mines, mule and electric. The mules are used for gathering the cars from the coal face and delivering them to a parting; the electric motors take the coal from the

is caged on both sides of the shaft while in others all the caging is done on one side, the empties being taken off on opposite side. The method of caging on one side is more generally favored. The mines throughout Williamson County are well ventilated. The type of fan generally used is the blower, and is generally reversible. The mining laws of the state require that the quantity of air in circulation shall not be less than 100



MAP OF THE PEABODY COAL CO.'S NO. 3 MINE, IN WILLIAMSON COUNTY, ILLINOIS

the more powder they use in blasting and breaking up the coal, the less the labor of producing it.

MINING DETAILS

According to the Illinois Coal Report, there are 24 mines in which machines are not in use; 6 mines in which machines are used exclusively, and 9 in which both pick and machine mining are used. There was approximately 1,832,915 tons mined by machines and 3,714,443 by hand. After the Cherry mine disaster the state legislature passed a law, compelling all operators to install telephones in the different mines, for use

partings to the shaft bottom where it is hoisted to the top. Gathering motors, used instead of the mules, would be of material advantage, owing to the fact that most of the mines use a large mine car, some of which have a capacity of from $3\frac{1}{2}$ to 4 tons.

In all of the large mines the track on the main haulage roads, where motors are used, is laid with 35- and 40-lb. steel on large white-oak ties. The side entries and rooms are laid with 16-lb., and the bottom partings at the shaft with 60-lb. steel.

There are two methods employed in caging the coal. In some mines the coal

cu.ft. per minute, for each person, and 600 cu.ft. per minute, for each animal in the mine.

PREPARATION OF THE COAL

A great deal of attention is paid to the preparation of the coal, every precaution being taken to see that the product is well cleaned and sized. The coal is all hoisted with self-dumping cages, dumped from the mine car into a weigh pan, and then passes over a double shaker screen. The top screen has 3-in. perforated-plates that allow the nut and slack to fall through on the bottom screen, which separates the nut

from the slack, or collects the two together as may be required. The portion of the coal that goes over the 3-in. perforated-plate, then passes over a section of 6-in. perforated-plate, making a 3-in. egg and a 6-in. lump. Four railroad cars are loaded at one time by this method.

Coal washing is carried on extensively throughout the field; at mines, where they have washing plants, all of the 3-in. or small coal is washed. The principal impurities in the coal are ash, in the form of slate, and sulphur in the form of pyrites. The large pieces of slate and sulphur can be removed from the egg and lump by hand picking. After the coal is thoroughly washed it is carefully

separated into different sizes. Washed coal finds a ready market, as it has a greater calorific value.

SUMMARY

The mining districts throughout the county are all pleasantly located, especially at Herrin and Marion. Marion is the county seat and is an enterprising city of nine thousand inhabitants. The miners are of superior intelligence, mostly Americans. The majority of them own their own property.

The shafts throughout this field have double hoisting compartments, and the tipples are built mostly of steel and equipped with all modern appliances to handle and screen the coal with the least

amount of breakage. The engine houses are generally built of fireproof material and first-motion engines are mostly used. The boiler houses also are built of fireproof material and are usually equipped with tubular boilers.

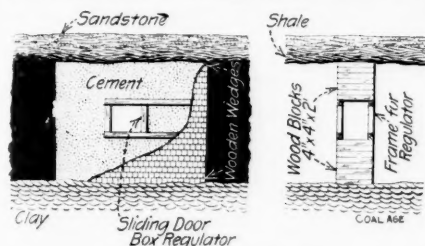
The same conditions exist in this district as in the whole competitive field, that is, the output far exceeds the market requirements. The competition is so keen and the selling price so close to the actual cost of production that there is often nothing left to take care of the depreciation of the plant and equipment, much less a fair interest on the investment. The chief beneficiaries of these conditions are the railroads, who generally name the price they will pay for coal.

Wood Block Stoppings

BY JOSEPH DANIELS*

Although gob, brick and concrete are widely used for mine stoppings, the use of timber blocks for this purpose is by no means common. In the mines of the Roslyn Fuel Co., at Roslyn, Wash., however, wooden blocks, 4 in. square and 2 ft. long, are in general use for building stoppings and dams.

The floor in the crosscut, or passage, in which the stopping is to be erected, is leveled off and the rib coal is cut away to a depth of 4 in., and for a distance of 2 ft. along the length of the passage, 2 ft. being the length of the blocks used. Also, the roof is straightened up as well



WOOD-BLOCK STOPPING

as possible. A course of blocks is laid on the floor and in each succeeding course the joints are broken or staggered. The 4-in. notch in the rib coal permits of a better bond than would otherwise be possible, and when the courses of wooden blocks are laid up to the full height of the opening, wooden wedges are driven in around the sides and top of the stopping to make the whole mass as compact and secure as possible. Later, both faces of the stopping are covered with a cement mortar, mixed from one part cement and two parts sand.

When the stopping is part of an overcast, the construction used is practically the same as described above, except that wooden stringers are placed on top of the stoppings to carry the bottom timbers of the overcast proper.

In some cases it is necessary to pro-

vide a door regulator in the stopping. With the wooden-block form of construction, this is easily accomplished by making two frames of the desired cross-section and placing these in position when building up the blocks. The necessary opening is thus left and the usual sliding door for regulating the amount of air is placed on the outside of the stopping, as is common practice.

The advantages claimed for this method of building a stopping are: 1. Low first cost; an ordinary workman can erect a stopping 6 ft. wide and 5 ft. high in eight hours, and the cost of materials, wood and cement facing, are exceedingly low. 2. The stopping is absolutely airtight and any squeeze or pressure coming on the wall compresses it and holds it together better than would be the case with other materials. For building dams, a similar method of construction is employed, the size of the blocks and their length being varied to suit the particular conditions existing at the mine.

Coal Famine at Butte, Mont.

EDITORIAL CORRESPONDENCE

Our worthy contemporary, *Fuel*, says in a recent issue:

While there never was what might be truly termed a coal famine in Butte, Mont., there have been times in past winters when there was danger of one. Since the Roundup Coal Co. commenced to send its supply to Butte, however, all danger of a coal scarcity was eliminated. The late W. W. Taylor, general superintendent of the coal property of the Milwaukee R.R. Co., once said that all along the line of the road in this state there never would be a scarcity of coal, even if the road had to buy its own fuel. His statement has been borne out by facts and over the Milwaukee line, from the famous Bull Mountain field, has since come a continuous supply of coal which has increased in volume from month to month. The figures for all the months of the winter show large increases over last year. Even if less coal is consumed on the hill at the present time on account of the use of compressed air for hoisting purposes supplied by electricity, the diminished demand for coal has not affected the Roundup company.

With due respect to Mr. Taylor as a man who stood at the top of his profession in the West, other operators in Montana will probably take exception to the above statements.

In the fiscal year ended Oct. 31, 1911, Musselshell County, in which the Roundup mines are located, produced 643,648 tons. During this same period, Cascade County produced 948,823 tons while Carbon County showed a production of 1,226,783 tons, or nearly twice that of Musselshell County; in fact, the production of Musselshell County is only a trifle over one-fifth the total output of the state, and in addition to this, heavy tonnages of Wyoming coal are shipped into Montana.

Despite the reassuring words of *Fuel*, we do not believe that any particular congratulations are due the consumer in Butte because of the Roundup mines.

Anthracite Storage Possibilities

Apropos of the impending strike, facilities for accumulating surplus supplies are of interest. Eliminating the storage facilities in yards and on piers at seaboard or lake points (for which there are no figures), it is estimated that the storage capacities of the principal operating anthracite companies are as follows, in long tons:

Lehigh Valley R.R.	1,585,000
Reading	1,110,000
Pennsylvania (Susquehanna Coal Co.)	880,000
Erie (Pennsylvania Coal Co.)	565,000
Central R.R. of New Jersey (Lehigh & Wilkesbarre Coal Co.)	560,000
Delaware & Hudson	270,000
Lehigh Coal & Navigation Co.	240,000
Lackawanna Coal Co.	200,000
Ontario & Western	180,000
Total	5,590,000

Coal Mining Institute of America

A meeting of the board of directors was held in the office of S. A. Taylor, Pittsburg, Mar. 9. Seven members of the board were present. It was decided to hold the summer meeting of the institute in Johnstown, Penn., June 19 and 20, and to confine the sessions to a discussion of practical problems.

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Electrical Machinery for Coal Mines

By Sydney F. Walker *

For practical purposes, the shunt-wound continuous-current motor and the three-phase induction motor, are best adapted for use in colliery work. Series-wound, and compound-wound continuous-current machines are, of course, readily obtainable, but except in special cases, the shunt-wound continuous-current type is the one most suitable for almost every kind of colliery work that can be named.

COMPARISON OF THE TWO TYPES

The shunt-wound continuous-current motor and the three-phase induction motor have gradually forced their way into general use, not only in coal mining, but in a great many other industries. There is a striking similarity in their behavior, particularly in the matter of government. The shunt-wound continuous-current motor, and the three-phase induction motor are the most perfect self-governing machines for the delivery of power, that have been devised up to the present.

It will be remembered that when driving machinery with steam engines, even those having the latest modern governors, a certain sensible time is required to admit the additional steam demanded with an increased load, or to shut off the steam that is not required with a decreased load. Further, it will also be remembered, that while steam engines are now made to maintain a uniform speed within about 2 per cent. of the normal, government for an increase or decrease of load is always preceded by a slight slowing up or increase of the speed of the engine, the speed returning to its normal value only after the new conditions of steam requirements are accomplished. The same remarks apply to engines driven by compressed air. And the reason for this is that there are three or four sets of apparatus which have to take part in the operation.

In the case of a steam engine, for instance, if the load increases, the engine slows slightly; the governor balls fall inward slightly, and either the throttle valve is opened a little more, or the slide valve or its equivalent, is caused to remain open for a little longer portion of the stroke. In any case, the operations one after the other take a certain sensible time, and while they are going on, the driven apparatus has its speed varied.

With the shunt-wound motor, and the three-phase induction motor, the operation is practically instantaneous, and is perfectly automatic. In the case of both machines, with an increased load, the rotating portion slightly decreases its speed and this decrease of speed allows the necessary increase of current to pass through the coils of the machine to

The shunt-wound continuous-current motor and the three-phase induction motor are the types best adapted for general use in colliery work. The similarity of the two forms, their advantages and disadvantages, are here discussed with special reference to their constant speed and self-governing properties.

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furnish the increased power required. With a decrease of load, the rotating portion slightly increases its speed, thereby automatically cutting off the excess current that is now no longer required. In both cases there is a difference in the speed at which the motor runs with different loads, but the difference throughout a wide range of variation of load, is trifling.

In the case of the three-phase induction motor for instance, what is called the slip is never more than 4 per cent., except when an excessively abnormal load is being driven. As explained in a previous article, the motor will go on slowing up, and will deal with largely increased loads at lower speeds, but for ordinary work, such as would be dealt with by a well governed steam engine, the variation of speed between no load and full normal load, is trifling. For all practical purposes the speed is constant. In the case of both classes of motor, it can be made absolutely constant, if the machine itself is made large enough.

HOW THE GOVERNMENT IS ACCOMPLISHED

As mentioned above, the governing is perfectly automatic; it depends upon the application of the same principles in the two machines, but in a slightly different manner. The government of the shunt-wound continuous-current motor depends upon the fact that the armature of the motor, when revolving, creates a reverse pressure, tending to reduce the current passing through the motor coils. When the motor is at rest, the whole pressure of the service, if allowed to do so, would drive a large and destructive current through the motor coils. To prevent that, the well known starting switches and resistances are employed, which reduce the pressure applied to the motor on starting, and until it has come up to its normal speed. The conductors upon the armature of the shunt-wound motor, being in motion in the magnetic field in which the armature as a whole revolves, obey one of the laws of magneto-electric induction,

and create an electrical pressure in their own coils, directly opposing that of the current which is causing them to rotate.

The working current with a continuous-current motor is the difference between the service pressure, and the reverse pressure created by the armature coils when running. This difference of pressure is usually a very small percentage of the service pressure. The energy taken by the motor, and converted to mechanical power, is measured by the electrical pressure delivered to the terminals of the motor, multiplied by the current passing through the motor coils; but the current passing through the motor coils is due to only a small pressure, usually a few volts. The electrical resistance of the armature coils of a continuous-current motor is small, and therefore a small pressure is sufficient to drive the necessary current through them. Hence it follows that a very small increase or decrease of the pressure causing the current to flow through the armature coils, is sufficient to cause a comparatively large increase or decrease of that current. Hence the automatic and perfect government.

THE GOVERNMENT OF THE THREE PHASE INDUCTION MOTOR

In the case of the three-phase induction motor, the currents passing in the rotor coils are due to the difference in the speed of rotation between the rotor itself, and the revolving magnetic field. This difference is called the slip. If it were possible to eliminate all the load upon the rotor, it would revolve at the same rate as the magnetic field, and the current created in the coils of the rotor would be nil. With a light load, the rotor increases its speed, and thus decreases the slip, and with it the current created in its own coils. With an increased load, the rotor increases its slip, and with it the current created in its own coils.

Again the electrical energy delivered to the three-phase induction motor is measured by the pressure at the terminals and the currents passing. To find the actual amount of energy, the power factor, and another factor required by the three-phase system, have to be taken into account, but they need not be mentioned here. The currents passing in the rotor coils are "induced" in them by the variations in the currents passing in the stator coils. The action is exactly like that in the stationary transformer, with the difference that in the case of the three-phase induction motor the secondary coils are in motion, whereas in the ordinary static transformer they are fixed. The same series of operations, however, goes on.

The quantity of current passing in the stator coils is determined by the load upon the rotor, and this again determines the amount of slip between the rotor and the revolving field. While the variations of the currents passing in the stator coils induce the currents in the rotor coils, the latter also react upon the currents in the stator coils. When the slip is small, that is to say, when the load is light, the inductive effect of the rotor coils upon the stator coils tends to decrease the current passing in the stator coils, by causing an increase in the reverse pressures, much as with the continuous-current motor. When the load is increased, and the slip is increased, the inductive effect of the rotor coils upon the stator coils is lessened, with the result that more current flows through the latter, the effect being the perfect self-government that has been mentioned.

ANOTHER POINT OF SIMILARITY.

Another important similarity between shunt-wound continuous-current motors and three-phase induction motors, but one which so far has not had any appreciable effect in colliery working, so far as I am aware, is the fact, that both machines are reversible in the sense of working as either a motor or a generator. When furnished with an electric current, they will deliver mechanical power; and, on the other hand, if driven by mechanical power, they will furnish electric currents.

The shunt-wound continuous-current machine is made originally to be used either as a motor or a generator. Its reversibility comes into play in a case where it may be driving some machine as a motor, and under certain conditions, the machine takes charge of it. The electric tram car illustrates this point. If shunt-wound continuous-current motors are employed in driving tram cars, they furnish mechanical power, under all conditions, except when going down hill. When descending a steep gradient, it should be possible to use them as efficient brakes. The power delivered to them by the descending car, should pump current back into the trolley line. It has been found somewhat difficult, however, to arrange for this in practice.

The three-phase induction motor will behave in exactly the same way, although I believe there have been no cases where this property has been made use of. It might be, however. It should be mentioned that all motors and generators are interchangeable; that is to say, they will all work as motors or generators, but the conditions of working, the conditions under which they will produce motive power or current, are usually different from those ruling with shunt-wound continuous-current, and three-phase induction motors. The great advantage about

these two forms of motor is the practically constant speed. As mentioned above, it is not actually constant. It varies with the load, but only slightly; and when reversal of operation takes place, when a machine that has been running as a motor, furnishes current as a dynamo, its speed should be approximately the same.

SPEED REGULATION OF THE TWO TYPES

This is the point at which the two forms of apparatus part company. The speed of the shunt-wound continuous-current motor can be regulated within wide limits. The shunt-wound motor, as ordinarily constructed, can be made to vary its speed 25 per cent. on either side of the normal, if required, by varying the current passing through its field-magnet coils. Weakening the current passing through the field, allows the motor to run faster; and if more current is at the same time allowed to pass through the armature coils, more work will be done, and *vice versa*.

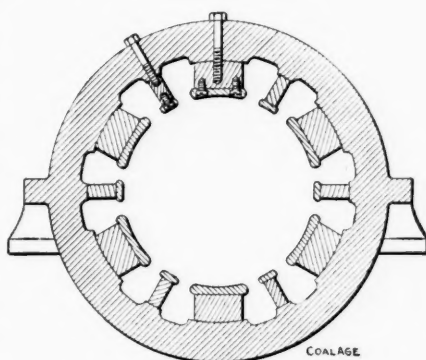


FIG. 1. FIELD OF INTERPOLE TYPE OF MOTOR

There is a limit, however, to varying the speed of the shunt-wound motor, owing to the increase of sparking at the brushes. The brushes are mounted upon a rocking arrangement, which allows them to be adjusted to meet the difference in the strengths of the magnetic fields produced by the field magnets, and the armature. It may be mentioned that it is the struggle, as it were, between the magnetic fields created by the two parts of the machine, which leads to a certain amount of the sparking. When the magnetic field of the electro magnets is decidedly predominant, sparking is reduced to a minimum. It increases with everything which lessens the difference between the strengths of the two fields. Hence, when the current in the field-magnet coils is reduced, and that in the armature coils is increased, the tendency to sparking also increases.

The sparking is reduced by moving the brushes through a certain arc, but a limit is found when reduction of sparking is no longer possible. For shunt-wound

motors which require to have their speeds regulated between wide limits, special provision is made by the addition of what are called commutating poles, or interpole field magnets. Small electro magnets are fixed on the inside of the containing cylinder, pointing radially inwards, similar to, but smaller than the field magnets proper. The office of these is to neutralize the excessive sparking, by practically suppressing the current which passes in each coil as it moves under the brush. With commutating poles, the speed of shunt-wound continuous-current motors may be varied in the ratio of 1 to 6; that is to say, a machine running at 400 r.p.m. may be run at from 100 up to 600. Fig. 1 is a cross-sectional view of the containing cylinder and field magnets of an interpole machine.

It should be understood that the shunt-wound continuous-current motor has two properties. When furnished with its normal field-magnet current, it will run at an approximately uniform speed, varying only slightly with large changes of load. It can also be arranged to have its speed varied within the wide limits mentioned above, and the two properties can be combined in the same machine.

It also has another property. It will go on furnishing power when demanded, by steadily slowly up, and allowing more and more current to pass through its armature coils, until the heating effect of the current is so great that the insulation is destroyed.

SPEED VARIATION OF THE THREE-PHASE INDUCTION MOTOR

With the three-phase induction motor, the means of varying the speed are but meager. Certain fractions of the normal speed may be obtained by cutting out a portion of the magnetic fields. It was mentioned above that there are several sets of coils in the slots of the drum forming the stator. Each set of coils and the set on the opposite side of the drum, represent a group of magnetic fields and a pair of magnetic poles. By cutting down the number of pairs of poles by half, the speed at which the motor runs is reduced in the same proportion. Similarly by cutting it down 25 per cent., the speed is reduced by 25 per cent.

The speed at which the motor runs depends upon the number of pairs of poles in the stator, and the periodicity of the currents. The usual periodicity with modern alternating-current machines is 50 periods per second, or 3000 per minute. For a machine to run at 500 r.p.m., therefore, there will be six pairs of magnetic poles, twelve sets of currents. By cutting out two sets of poles, the speed would be reduced by $33 \frac{1}{3}$ per cent. and so on.

News of the Coal Strike Situation

Over 1,000,000 miners have been on strike in Great Britain since Feb. 29; about 200,000 men are now striking in the Westphalian coal fields of Germany; two-thirds of all the French coal-mine workers recently indulged in a 24-hour exhibition strike to proclaim their unity in support of certain demands; 45,000 miners in Belgium now threaten to strike; and in the United States "coal strike" is being talked of from one end of the country to the other.

There is little doubt that the strike of British miners has exerted at least a moral influence in bringing about the minor demonstrations in Germany and France. It may be expected that it will also, to some extent, have a similar influence in the United States.

The demands of the anthracite miners in this country have met with an unqualified refusal from the operators, as was more or less expected by everyone concerned. The operators make it known, however, that they will consider any modified demands that the miners may arrange to present.

No definite conclusions regarding the outcome of the controversy in the bituminous field can well be drawn until after the joint conference, in Cleveland, on Mar. 20. Even if a basis of agreement is reached at this meeting, there will scarcely be time enough before Apr. 1 to arrange the various state contracts, but, it is just possible that in such an event, there will be no general suspension of work on the expiration of the present agreements.

The Illinois miners have, however, voted to go out pending the adjustment of a wage scale, and the Iowa and Indiana organizations are confidently expected to follow suit. Similar action has also been customary throughout Pennsylvania and Ohio. The mine workers of Missouri, Kansas, Texas and Oklahoma are bound by agreement to remain at work for at least 30 days after Mar. 31, pending a negotiation of the new contract.

ANTHRACITE CONFERENCE

At the conference of anthracite operators, held in New York City, Mar. 5, a large number of independent coal men were represented, as well as officials of all the larger mining companies. The conduct of the meeting was reported to have borne some evidence of prearrangement. It was agreed to refuse the demands of the miners *in toto*; and a committee of ten was appointed to present this reply to the miners' representatives at the joint conference in New York on Mar. 13.

The opinion of the conference was unanimously expressed as against a one-

Special Correspondence

The demands of the anthracite miners have met with a blunt refusal; and modifications must be discussed or a strike called. The bituminous fields await the result of the joint conference in Cleveland, Mar. 20. Progress of strikes in Great Britain, Germany and France.

year agreement, and although a five-year term was advocated by some, the majority favored a three-year contract. The demand for an eight-hour day was opposed on the ground that, to reduce the hours, means an increase in wages and a reduction of output. Recognition of the union and the "check-off" was refused partly because these provisions would virtually amount to making the operators act as agents to help support the Union. The abolition of the conciliation board was opposed on the ground that this board has proved itself an efficient means of maintaining stable conditions in the industry.

The demand for an increase of 20 per cent. in wages was declared by the operators to be exorbitant. However, the advisability of offering a 5 per cent. increase has received serious consideration from the heads of some of the large coal companies.

BITUMINOUS CONFERENCE

Representatives of bituminous-coal operators and miners met in Chicago, Mar. 5, and agreed to hold the second joint-scale conference in Cleveland, Mar. 20. W. K. Field, of Pennsylvania; E. A. Cole, of Ohio; J. C. Kolsen, of Indiana, and H. N. Taylor, of Illinois, represented the operators. John H. Walker, of Illinois; Francis Feehan, of Pennsylvania; John C. Moore, Ohio, and W. D. Van Horn, Indiana, together with John T. White, president of the United Mine Workers, represented the miners.

The demands of the bituminous miners are briefly as follows: (1) Payment on the mine-run basis; (2) flat increase of 10c. per ton; (3) seven-hour work day, five hours on Saturday; (4) 20 per cent. increase for all day labor; (5) weekly pay days; (6) no limit to the deductions made by employers for miners' organizations; (7) readjustment of the machine differential at the basing points in the competitive states.

ILLINOIS CONVENTION

The convention of Illinois miners adjourned, Mar. 1, after adopting a scale of wages prepared by its scale committee,

and after voting to quit work, Mar. 31, pending the conclusion of an agreement with the operators. The schedule of wages adopted would have the effect of adding about 2c. a ton to the present cost of mining even before the percentage increase is added that is called for by the demands of the national convention.

After a short session, Mar. 1, the conference between representatives of the miners in Missouri, Kansas, Texas and Oklahoma, and representatives of the Interstate Southwestern Coal Operators Association adjourned, subject to recall at any time. No steps of any consequence were taken in regard to deciding on an agreement, but it is expected that another meeting will be held in Kansas City as soon as some definite action has been taken in the central competitive field.

In strong contrast with reports from other fields is the news from Colorado that the strike of two years' duration in the northern field has been settled so far as the eight mines of the American Fuel Co. are concerned and several hundred men at Lafayette and Louisville have returned to work.

THE BRITISH STRIKE

The British Government has been trying to bring the coal miners and owners together, and has at last succeeded, although the acceptance of the miners' delegates was coupled with the reservation that the principle of a minimum wage should be excluded from discussion. This, however, does not imply that the schedule of rates drawn up by the miners will not be discussed. The miners' representatives are not authorized to agree to any reduction of the federation's schedule of wages or to any scheme for determining these rates, without a new ballot by the miners.

STRIKE IN GERMANY

A coal strike went into effect in the Westphalian coal fields, of Germany, Mar. 11, when more than 50 per cent. of the 350,000 miners, there employed, obeyed the call of their leaders to cease work. In some districts the cessation of work was practically complete, while in others only from 15 to 30 per cent. of the men went out. Several riots and numerous attacks on the men who continue at work and on the police are reported.

There is every probability of a coal strike throughout Belgium that will affect 45,000 colliers. The miners in the Liège basin have charged their delegates to ask for higher wages, and those in the vicinity of Charleroi have unanimously decided to ask for a 15 per cent. increase. If their demands are not granted they all threaten to go on strike.

A Successful Type of Rotary Dump

BY A. E. LINDROOTH*

The large number of disastrous mine explosions that have been caused by dust during the last few years has awakened the attention of mine operators to the need of controlling this source of disaster, particularly as regards accumulation of dust along the main haulage ways; and naturally, one of the most efficient ways to control dust is to prevent its formation. On haulage roads,

shaft that is set somewhat off center, as soon as the foot brake is released the dump revolves and empties the car. After dumping, the counterweight causes rotation in a reverse direction and brings the empty car to an upright position, after which it is bumped off by the next following loaded car just as in the working of the ordinary cross-over dump. The operation is rapid, and is always under control of foot brake.

The advantage of this style of dump over the old-style end-tip dump is two-fold. First, the elimination of the end

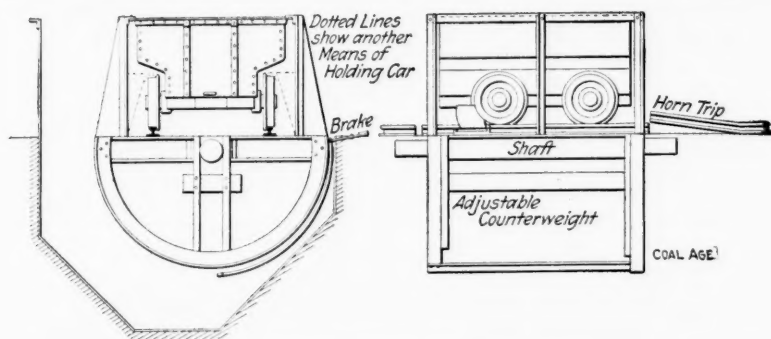


FIG. 1. ROTARY DUMP FOR MINE CARS

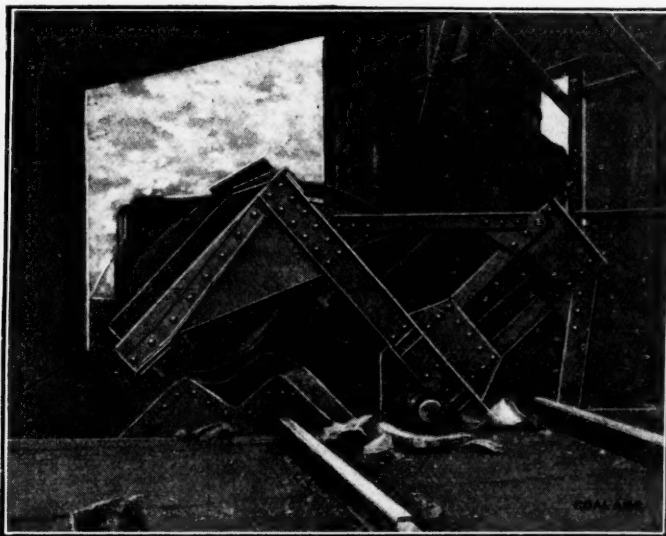
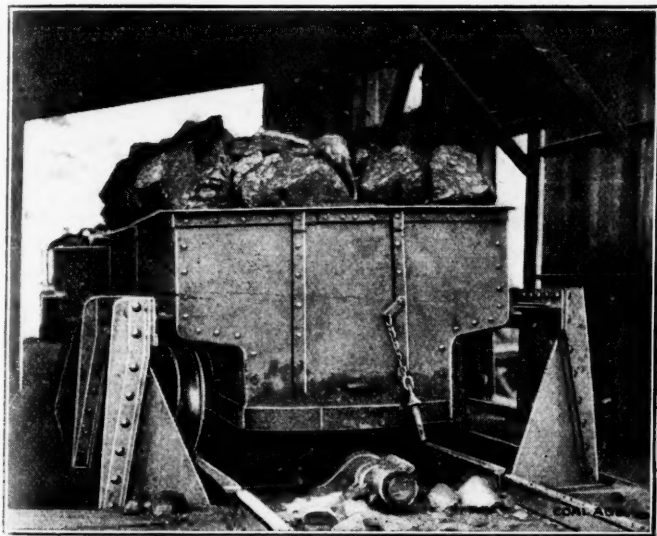


FIG. 2. TWO VIEWS OF ROTARY DUMP, SHOWING CAR IN NORMAL AND DUMPING POSITIONS

a great part of the dust is caused by leakage of coal through the car doors, this coal being ground in the course of time into explosive powder.

The rotary dump shown in Figs. 1 and 2 was designed by the Link-Belt Co. for the Consolidated Fuel Co. of Hiawatha, Utah. It has now been in successful operation for the past 18 months and has entirely solved the question of leaky cars at this mine.

No motive power is required for operating this device. The pit cars are run onto the dump platform, which is equipped with locking horns and angle bars to keep the cars from falling off when overturned; and being pivoted on a

door makes possible a perfectly tight car and thus entirely stops the leakage of coal along the haulage roads, a feature which is of obvious value in preventing waste and danger of explosions. The second point of advantage is the increased strength of the car. Without question, the weak points of the average mine car are the door and the door latch. Eliminating these two points, the car is made much stronger and entirely freed from the annoyance due to loose doors and broken latches.

This style of car dump has been in use for some time at other mines also and it is reported that the breakage of coal is no greater than with the ordinary end-tip form of dump.

Effect of Panama Canal on Shipping

When the Panama Canal is opened in the month of June, 1913, steamers en route from Europe to San Francisco will no longer go via Cape Horn, a route of 13,621 sea miles; but will save 6200 sea miles via the canal route. Steamers proceeding from Montreal to Sydney now cover 13,690 sea miles; but in the future will be able to do so over a route of 10,952 sea miles.

It is difficult to predict the effect of the canal upon freight traffic between Europe and Valparaiso, the Cape Horn route being only 2100 miles longer than the canal route. Passenger ships probably will pass through the canal, while the East coast of South America will be served by auxiliary ships sailing from West Indian ports. It is assumed that a part of the business from New Zealand to Europe, which today comes via Cape Horn, will pass through the canal hereafter, saving 1600 sea miles. The chief part of the steadily increasing business between New York and New Zealand should, therefore, proceed via the

canal, rather than by the Cape of Good Hope, thus saving 2300 sea miles.

The probable changes in navigation routes will create equally great changes in the distribution of the coal trade, for which British firms are already making preparation. It is stated that British firms are now making arrangements to open a coaling station at Nukulopa, the capital of the Friendly Islands, and upon Pitcairn Island.

West Virginia Coal Mining Institute

The next semiannual meeting of the institute will be held during the second or third week of June in Charleston, W. Va.

*Boston Building, Denver, Colo.

The Japanese Coal Industry

By H. F. Bain*

The Miike colliery, visited by one section of the American Institute of Mining Engineers, belongs to the Mitsui family, which, because of its wealth and age, has been not inaptly characterized as the "Vanderbilt family of Japan." The Mining Department of the Mitsui Gomei Kaisha (Mitsui firm) operates both metal and coal mines; and it was to the most famous among the latter that the visitors were taken.

HISTORICAL

The Miike colliery is situated on the Gulf of Ariake in the island of Kyushu. Coal has been known to occur at this point for many years, and was mined a little by native methods, even before the government in 1873 took possession, and under an English engineer opened the first modern pit. In 1889 the property was transferred to the Mitsuis, who made radical and extensive changes, opening new pits in succession, until there are now six working mines, with an average daily output of 6,000 tons. In 1910 the total output of the Miike mines was 1,799,489 metric tons, of which 41% was exported.

The Miike coal has a well established and enviable reputation throughout the Far East, for both its steaming- and its coking-quality. There are eight beds on the concession; but mining is, as yet, confined to the Miike or upper seam. This averages something over 9.5 ft. in thickness, has no clay bands, a hard sandstone roof and a firm fire-clay floor. The coal has been mined for a distance of nearly two miles along the strike, and is open nearly as far down the dip, which is 10 per cent. The deepest shaft, the Manda, which is 41x12 ft. in cross-section, is 900 ft. deep. From the bottom the workings extend down the dip to a total depth of 1132 ft. below sea level.

LARGE VOLUMES OF WATER

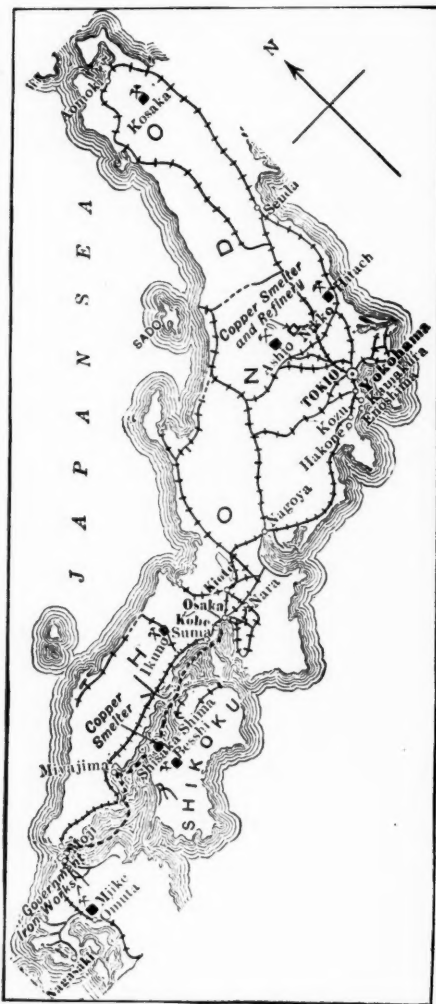
As the overlying material is a soft Tertiary sandstone, the amount of water to be handled is unusually large. Only in the Pennsylvania anthracite district are there any American collieries where the ratio of water to coal is comparable, and even there it is less.

At the Miike mines, 12 tons of water must be raised for each ton of coal won. At the Manda shaft alone, the ratio is 20 to 1, and roughly 1000 cu.ft. per minute were being pumped on the day we visited the pit.

To raise such a quantity of water from such a depth requires large and expensive pumps, and those at the Manda shaft are said to be the largest at any colliery in the world. The most impressive are the 4 Davey Cornish pumps,

The equipment of the Japanese mines is modern throughout. Larger volumes of water are handled as a rule than at any other collieries. Excellent sociological regulations are in force.

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Note—Abstract of paper in the January number of the Bimonthly Bulletin of the A. I. M. E.



MAP OF JAPAN, SHOWING RAILROADS AND MINES

with compound steam-cylinders, of which the high-pressure is 45 in. in diameter, the low-pressure 90, the water-ram 22 and the stroke 12 ft. The pump has a speed of 8 to 10 strokes per minute, and two of the pumps are held in reserve. In addition, there are 5 Janesvilles, each capable of handling 300 cu.ft. per minute against a head of 900 ft., and various smaller pumping engines.

The final capacity of the pumps at this shaft is to be 3000 cu.ft. per minute against a 1000-ft. head. An aggregate of over 16,000-hp. is used in pumping, but, despite this, less than 10% of the coal mined is used at the colliery. Coal is also burned to generate steam for many purposes. The amount will be reduced when improvements now under way are completed. At present coke is made in beehive ovens, of which 60 are in operation, burning 300 tons of coal per day and making 180 tons of 48-hour coke. About one-half of the gas is now used. There are now building, however, Coppee ovens; and with the gas from these two, 2000-kw. gas-engines, will be driven to supplement the five 1000-kw. Curtis steam-turbine generator-sets now in the central power station.

MINING METHODS AND SOCIOLOGICAL CONDITIONS

The coal is worked on a retreating pillar-and-room system; the roadways being 20 ft. wide and spaced at 130 ft. intervals. The coal has an extremely irregular cleavage, and is mined without either powder or shearing. The miners (called "hewers" as in England) pick the coal from the face with small single-pointed picks, and are paid by the ton, as in America. The coal is forked into cars holding 1400 lb. and taken to the shaft by means of horses and endless rope. The close cleavage and the system of mining give a large percentage of fine coal, there being 45% of lump over a 2-in. screen, 10% of nut, between 2-in. and 7/8-in., and 45% under 7/8-in. The lump coal is sent over a picking belt, where women take out the slate. Nut coal is washed, and the fine coal is made into coke.

There are 11,700 mine workers, of whom 33% are women. The miners work in 8-hour shifts, but surface workers put in 10 hours. Nominally, wages are low, miners getting 35 to 40c. per day and women coal-pickers about half as much. This, however, does not tell the whole tale. For example, house rent is free in some cases, and nearly so in others. Food sold at cost or below. For rice, the staple food, the price is fixed; varying only with the term of service of the employee. Miners who have been with the company for five years are now buying their rice at about one-third what it costs the company in the open market.

There is a charge of 7 1/2c. per month for sanitary service; but the boiled drinking-water is furnished to all miners' houses. Schools, hospitals, a day-nurse for children, sick-benefits, accident and

death-benefits, and amusements are all provided by the company; and, to serve miscellaneous wants, a store is maintained, with prices so regulated that in three years the total profit was less than 88. This is not the American way of doing things, but quite accords with the Japanese notion of regarding a business as a family enterprise and the employees as members of the family.

EXCELLENT MANAGEMENT

The yield of coal per miner is about 2 tons per day, or 1 ton per employee. A larger supervising staff is employed

than in the United States, there being 40 bosses for 2200 men. All the work about the shaft and indeed the whole property, has been excellently designed and executed.

A particularly commendable feature is the permanent character of the steel tipples, brick stations and stables, heavy rails underground, set on large ties and with rock ballast. When it is remembered that a modern colliery lasts 40 to 50 years and often longer, the real economy of such features, coupled with retreating mining, is apparent. That in a country of high interest charges such

as Japan, the directors should go to expense in this direction, is especially striking.

The technical work at the mine is under the direction of a skilled force of engineers, graduates of the Imperial University of Tokyo. Among those at the mine may be mentioned Messrs. H. Uyeki, Vice-manager of mines; J. Fujioka, Mining Engineer; T. Tomita, Superintendent at the Manda shaft; T. Takasu, Superintendent of Transportation; D. Kurita, Superintendent of the Harbor; and K. Akabane, Manager of the Sales department.

The Practical Side of the Engineer

By H. G. Haffner *

Some notes and observations on the relations of the engineer to the underground officials. Maximum efficiency in mining is attained only by those in each department having a thorough understanding of the work done by the other branch of the industry.

*Mining engineer, with Lehigh Valley Coal Co., Wilkes-Barre, Penn.

Note—Abstract of paper read before the Shamokin Y. M. C. A. Mining Institute, Mt. Carmel, Penn.

The mining engineer should have two main objects in all his dealings with inside foremen and other inside employees:

First, their safety from any accumulated bodies of water, or gas, in any old workings of their own, or adjoining collieries.

Second, that the mining and robbing be done in such a manner that the greatest possible percentage of coal is removed at the least possible expense.

In order to see that the first object is carried out, the engineer should give the foreman safe distances to drive, when approaching old or abandoned workings containing accumulations of water or gas; also give courses, distances and dips at which to drill holes to tap these bodies of gas or water.

He should also give lines for driving all places along barrier pillars between his own and adjoining collieries for the present, as well as the future safety, of the inside employees.

HIS RESPONSIBILITY

At many collieries, now working in this field, and operated years ago by individual owners, there are a large number of crop falls made in the Mammoth and Buck Mountain veins, which are now filled with water. The engineer should see that the inside foreman's attention is called to any workings approaching these crop falls, and have the water removed from them either by pumping it out or filling in; where practical, they can be filled with silt.

The engineer further aids the foreman by furnishing him with blueprints, to the scale of 100 ft. to 1 in., of all workings, or, better still, tracings which are posted every three months. Tracings are better for the foreman, as by having them he can, by fitting one over the other, see how the workings in one seam are in relation to the others. The prints, however, have the advantage that they can be taken into the mine and examined on the job. Personally I feel that the foreman should have both.

In flat or pitching seams, the engineer should place lines for driving all breasts. Where two or more splits of any seam overlie each other, with small partings of rock or slate between, breasts should be driven over breasts, and pillar over pillar, in order that the overlying strata be better supported, and the robbing of pillars carried on to the best advantage. Where the foreman wishes to drive counter gangways, for the purpose of reclaiming pillars lost in previous mining, the engineer can aid him by giving the proper elevation at which to start.

The engineer can also aid the foreman by seeing that the robbing is carried on systematically; that is, that the overlying seams are robbed in advance of the underlying.

He can also establish chain pillars for the support of the upper gangways, protection of tunnels, shafts and surface improvements, such as boiler houses, breakers, engine houses, etc. Where silting is to be done, he can lay out plans for the method of conducting the material to the different areas to be silted. After silting is completed, it should be carefully marked on the maps and tracings, in order that the foremen can readily see which areas have been silted in relation to the removal of the pillars.

The engineer should also keep the foreman advised as to where surface falls, from mining or robbing, are likely

to occur adjacent to any bodies of water, culm, railroads or other surface improvements: where mining is done under towns this is a serious and difficult matter. It seems as though practically all the towns in this section of the anthracite coal fields were built over the coal basins, thus entailing an enormous additional mining expense to the coal companies, as well as the loss of considerable crop coal left in for the support of surface improvements.

ASSISTING THE FOREMAN

In estimating the cost of new improvements, the engineer can aid the foreman materially, as these estimates are generally prepared by him and he is familiar with the cost of doing this class of work. This includes work such as tunnels, pumps, engines, column and steam lines, steel timber, etc., and quite often a scheme which looks good is found impracticable on making a careful estimate of the cost.

Steel timber is being largely used in permanent places, such as slope bottoms, turnouts in the main haulageroads, pump and engine houses, etc., in order to save the maintenance cost and decrease the fire risk. The foreman, wishing to place steel timber in any given location, will state the size of good timber, which he would suggest using, and refer the requisition to the engineer for figures on the correct size of steel timber.

When the foreman wishes to drive a breast through to the surface, for the purpose of ventilation or for any other reason, he calls on the engineer to place points on the surface so that the work can be done from both ends, thus saving considerable time.

The engineer on his trips to the mines often sees points which, in his opinion, could be improved, and he should offer suggestions to the foreman in regard to them. This should be done, however, not in a spirit of criticism, but only with the thought in his mind that they are both doing what is to the best interests of their employer.

Electrical Equipment, D.L. & W. Mines

The electrical equipment of the collieries of the Delaware, Lackawanna & Western R.R. Co. is unusually extensive and the central-station and distribution systems are excellent examples of modern engineering. About 20 collieries are comprised in the operations of this company, all of them situated in Lackawanna and Luzerne Counties, in the northern, or Wyoming, anthracite coal field of Pennsylvania, their output for the year 1910 being approximately 8,000,000 tons. All these collieries, with two exceptions, use electricity for both light and power, and even these two have small isolated generating plants for lighting service only.

Most of the mines have had electric service for a number of years, the original equipment consisting of direct-current engine-driven generators, some of which are still in operation, while others are now held merely as reserves. The

Special Correspondence

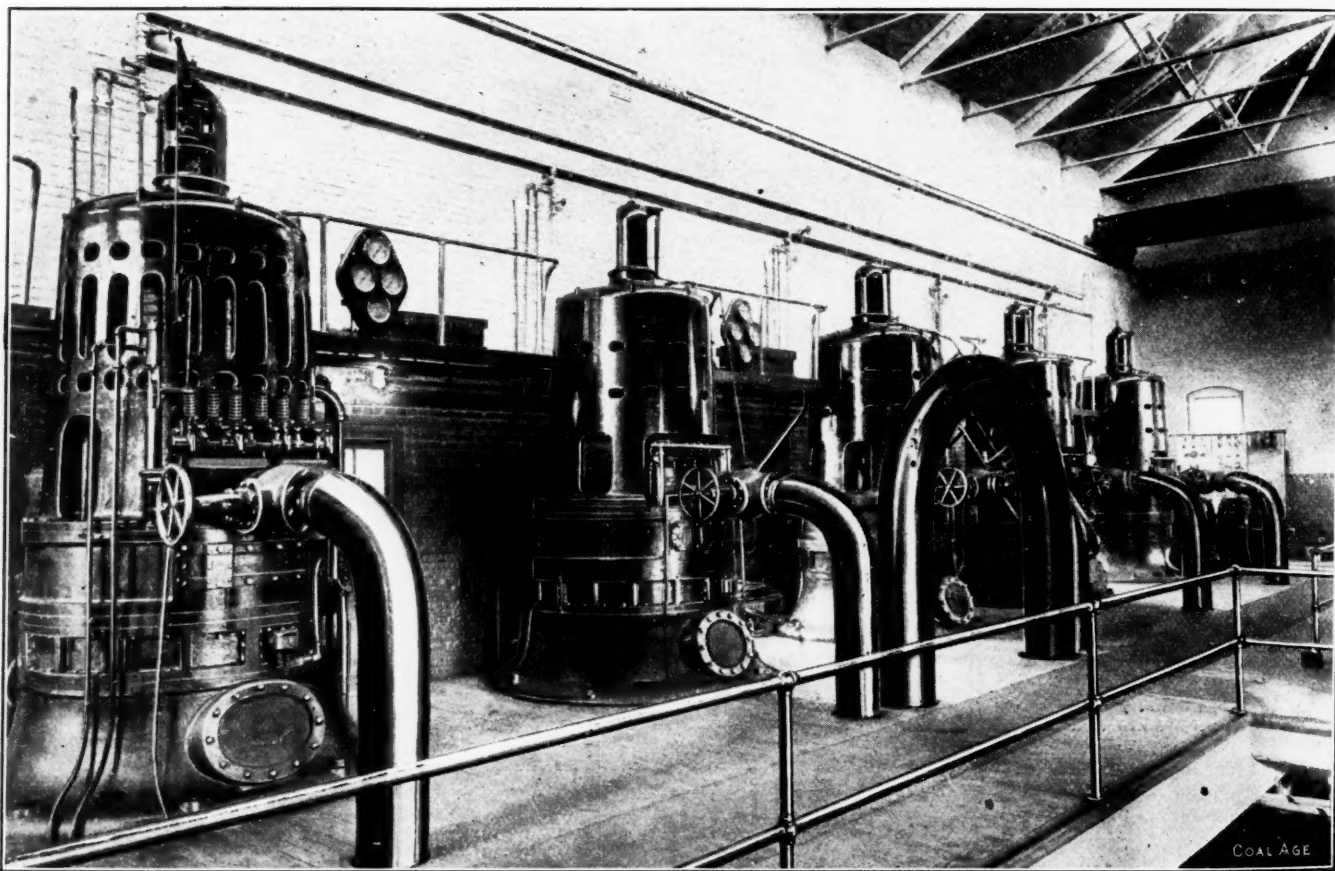
The electrification of the D. L. & W. coal properties is unusually complete and extensive. Motors are installed, having a total rated capacity of 27,618 hp. The central-station and substation practice and the distributing system are here outlined as are also the applications of electric power to haulage, hoists, pumps, and other auxiliaries. The equipment of the Truesdale colliery is taken up in detail.

ternators are 4150-volt units. Three potentials are used in transmission. They are: 2300, 4150 and 16,000 volts. The capacity of the Hampton station is 6500 kw., that of the Nanticoke power plant is

generator sets. The total number of rotary converters at present installed is 26, and their rated capacity is 6650 kilowatts.

MINE HAULAGE

Electric mine locomotives are extensively used by the Lackawanna company, there being 170 now in service; 125 of these are 6½-ton cable-reel motors, and 45 are 10-ton straight-haulage units, making a total motor capacity of 10,750 hp. A large number of these locomotives operate at 250 volts, and current is normally supplied at 275 volts in order to take care of the line drop involved by the length of the feeders. In one mine 550-volt current is used for this service, and in five of the mines, direct current for haulage is supplied through a three-wire system at 275 and 550 volts. Also, five collieries have direct-current engine-driven sets arranged to operate in parallel



CURTIS TURBINE GENERATORS, HAMPTON POWER PLANT, SCRANTON, PENN.

main sources of electric supply, at present, are two central stations, equipped with steam turbine-driven generators; one of these serves the upper district in the vicinity of Scranton, and the second supplies the lower district around Nanticoke.

At the Hampton station, in Scranton, current is generated at 2300 volts, three-phase, 60 cycles, while the Nanticoke al-

2500 kw., and, in addition to these, there are engine-driven sets having a rated output of 2390 kw., so that the aggregate available generator capacity is 11,390 kilowatts.

Twenty-one rotary-converter substations are located at the various collieries, while a few of the more distant mines are not supplied with converters, but continue to operate the old engine-driven

with the rotary converters, and in this way reduce the investment cost of the current-distribution system. The distance covered by the feeder systems for locomotive haulage is more than 148 miles, while the transmission distances from the turbo-generator stations total about 35 miles.

One of the most important applications of electricity in these mines, aside from

that of mine haulage, is found in the use of electrically driven hoists. For these, both alternating- and direct-current motors are used. There are 27 of the for-

asmuch as these two centrifugal pumps and the water hoist represent a total demand of 2800 hp., they constitute a most important factor in determining the peak

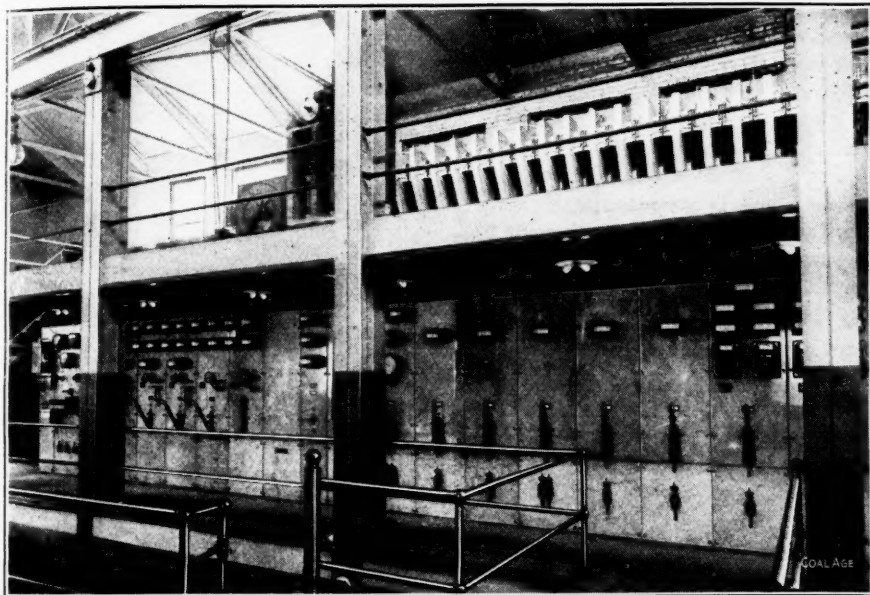
mately normal level by successively throwing into service the two centrifugal pumps and the water-hoisting outfit.

The water which is elevated from the Hampton sump is utilized in various ways before it is discarded. It first passes to a reservoir where it is used for the operation of barometric condensers in connection with the steam-turbine plant; and from the condensers it passes to a washery, being thereafter used for slushing ashes, crushed rock and other mine refuse through bore holes into worked-out sections of the mines.

BREAKER DRIVES AND AUXILIARIES

In addition to those already enumerated, there are 127 alternating-current motors, aggregating 530 hp. in capacity, and 12 direct-current motors, totalling 225 hp., that are used for auxiliary service at the mines and collieries. Fifteen of these are employed to drive rock crushers, by means of belt drives, and a number are belt-connected to fans, although most of the ventilation in these mines is still carried on by means of engine-driven fans.

An interesting application of individual



SWITCHBOARD, HAMPTON POWER STATION

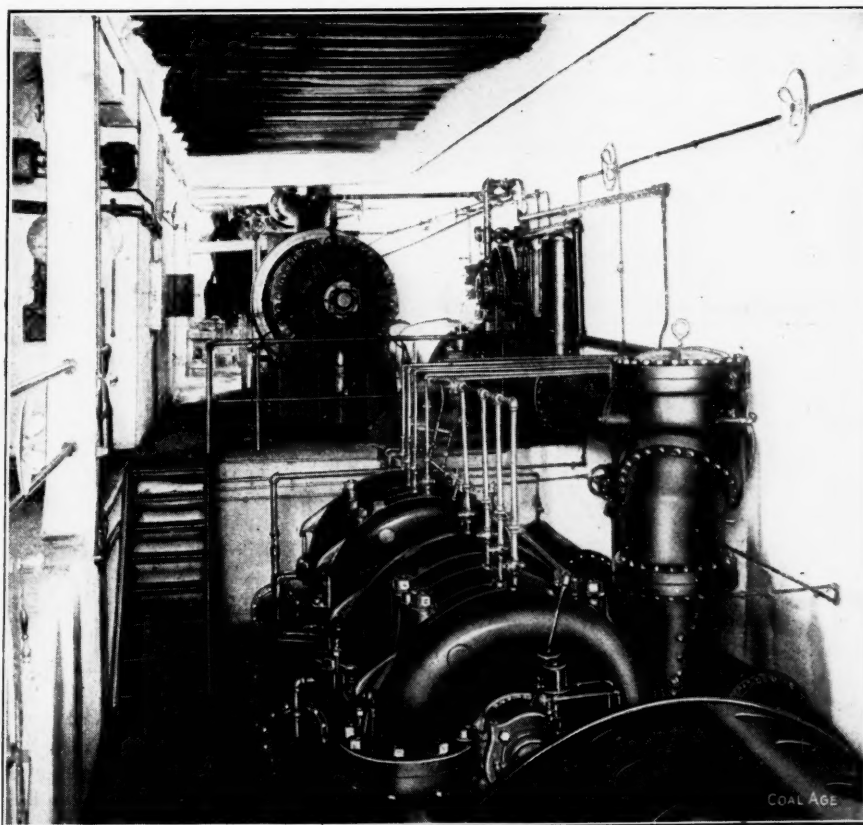
mer type, having a total capacity of 3570 hp., and 25 direct-current motor hoists, taking about 2420 hp.; an aggregate of about 6000 hp. is required for this class of service.

PUMPING SERVICE

The notable improvements in the design of centrifugal pumps during the last few years have resulted in numerous installations in the mines under consideration, both for auxiliary pumps and for operation at the main sumps. As in the case of the hoists, both alternating and direct-current motors are used, although, due to the characteristics of the induction motor, all the newer stationary pumping sets are driven by alternating-current machines. These with their high efficiency at constant speed and uniform load, are peculiarly adapted for the operation of centrifugal pumps.

There are 46 alternating-current motors, aggregating 5670 hp., used in pumping service, and 48 direct-current motors, with a total capacity of 1400 hp., used for driving pumps of both the centrifugal and plunger type. Most of the direct-current sets are small auxiliary units, and a number of them consist in 300-ft.-head portable plunger-pumping outfits mounted on trucks, which can be hauled to various locations in the mines and operated from the locomotive feeder wires.

In addition to the motor-driven water-hoisting equipment, the sump at Hampton is served by two six-stage centrifugal pumps operating at 720 r.p.m. against a 500-ft. head. Each pump delivers 5000 gal. per min., and is directly driven by a 1000-hp., 2300-volt induction motor. In-



SIX-STAGE MOTOR-DRIVEN CENTRIFUGAL PUMPS

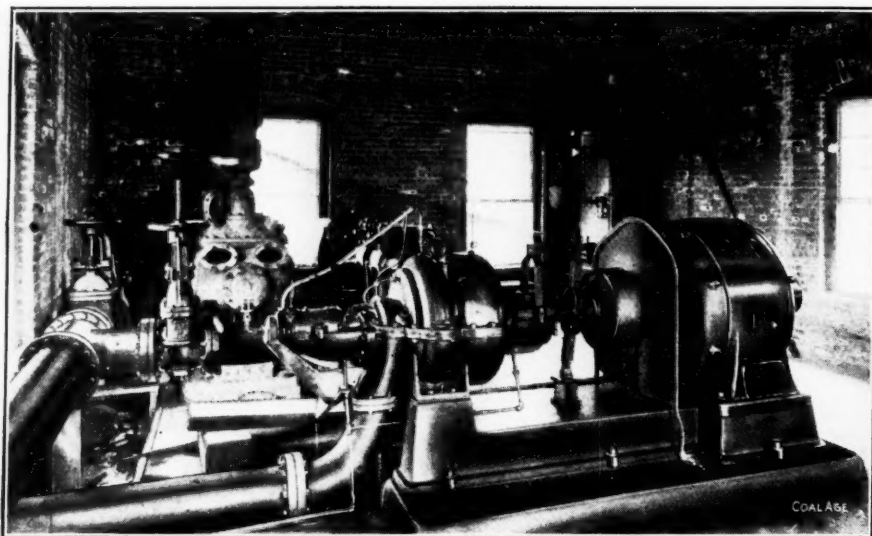
load of the Hampton generating station, and for this reason they are normally operated at night, the sump being of sufficient size to take care of ordinary drainage during the day time. As the demand on the power station diminishes toward the end of the working day, the load on the generators is brought up to approxi-

motor drive is found in three of the breakers operated by the Lackawanna company. These are equipped with induction motors, direct-connected to various driving shafts, thereby minimizing the number of belts required, and reducing the friction losses inseparable from the operation of breakers by means of

steam engines. Individual drives for these breakers were adopted about seven years ago, and their efficiency is indicated by the records of the Truesdale breaker, which handles between 3500 and 4000 tons per day with a power consumption of approximately one kilowatt-hour per ton of coal, including the hoisting of the coal to the top of the breaker.

The extent to which electric drives have been adopted at these collieries is shown by the following list of aggregate motor capacities:

	Hp.
Direct-current locomotives	10,750
Alternating-current hoists	3,571
Direct-current hoists	2,420
Alternating-current pumps	5,670
Direct-current pumps	1,402
Alternating current, miscellaneous	3,580
Direct current, miscellaneous	225
Total, alternating current	12,821
Total, direct current	14,797
Grand total	27,618



TWO-STAGE MOTOR-DRIVEN PUMP, TRUESDALE WASHERY

TRUESDALE COLLIERY

The electrical equipment of the Truesdale colliery will serve as a typical example of the substation practice of the coal department of the Delaware, Lackawanna & Western R.R. Co. Power is transmitted at the generator voltage from the Nanticoke station and received at a transformer substation located at the colliery. The substation equipment includes stepdown transformers and two six-phase rotary converters, one of 200 kw. and one of 500 kw. capacity. The current, which is received at 4150 volts, is stepped down in the transformers to about 200 volts for the operation of the rotary converters, and separate transformers supply 440-volt circuits for the induction motors.

Steam is still used at Truesdale for hoisting in the shafts, operating ventilating fans and heating the breaker, but all other operations are carried on electrically. The total current consumption averages 12,000 kw.-hr. per day, about one-

third of this being required for the breaker.

The local current distribution and control are provided for by means of a switchboard containing a totalizing panel, and feeder panels for the various alternating- and direct-current circuits.

There are 16 locomotives in operation at this colliery, having a total capacity of 1150 hp., but, as they constitute an intermittent demand, the 500-kw. rotary converter is of ample capacity for their operation, and in addition it serves five motors with a total rated capacity of 937 hp. for driving car hoists on slopes. When the day load diminishes, the direct-current equipment is switched over to the 200-kw. rotary converter, which was originally of ample capacity to carry the entire load, but is now normally held for night operation or emergency service.

Of the 13 pumps at this colliery, which have a total capacity of 610 hp., all but one are located in the mines. The track or portable pumps are driven by direct-current motors, while all stationary units are of the induction motor-driven centrifugal type.

Three 250-kv.-a. 4150- to 440-volt transformers are provided for the alternating-current circuits on which 30 motors, with a total capacity of 700 hp., are operated. Most of these are used for individual drives in the breaker and the remainder operate the conveyor lines, a rock crusher and ventilating fan.

In the operation of the breaker improved working conditions have been attained by the installation of a 75-hp. motor, which drives an exhaust fan for clearing the breaker of dust.

IMPROVEMENT OF POWER FACTOR

Owing to the number of induction motors used at this colliery, the question of maintaining a high power factor is an important one, and it has, therefore, been

decided to substitute a 100 kv.-a. synchronous motor for the 75-hp. induction motor now driving the fan. This will mean that the synchronous motor will be loaded to approximately 70 per cent. of its capacity, and the necessary leading current for raising the power factor locally will be most economically obtained.

Practically all the transformers used in this equipment are three phase, 60 cycle. The cables are carried into the mines through bore holes or down the hoisting shafts where they occupy space that could not otherwise be utilized. The electrical apparatus described above was supplied by the General Electric Co., Schenectady, N. Y.

The Fuel Situation in California

Oil is used almost exclusively in the state of California for the manufacture of gas and, with a few exceptions, for generating steam in stationary plants, railroads and on the coast steamers. The bulk of the ocean steamers trading regularly at San Francisco, San Pedro and San Diego are also equipped for oil burning. Also the Southern Pacific, Union Pacific, Santa Fé and Western Pacific railroads use absolutely no coal on their Pacific Coast divisions; consequently this latter fuel is practically eliminated as a factor in steam producing and its use at the present time is confined almost entirely to household requirements.

To meet this demand, since there is no local coal, other than a second-grade lignite, this market is entirely dependent on foreign and Rocky Mountain coals. Twenty to thirty years ago considerable house coal was imported from Great Britain, chiefly English Cannel, Scotch Splint and Westminster Brymbo, but since the opening up of the British Columbia coal fields the bulk of the domestic fuel has come from that source. For the past ten years a high-grade domestic coal has been imported from Australia which has found solid favor in this market. The f.o.b. price of this coal is now, and has been for the past five years, \$2.70 per long ton, and its delivered value is naturally dependent on fluctuations in freight rates.

Accurate data as to Rocky Mountain coals coming in by car are unobtainable, but there is little doubt that it is making considerable headway, especially the Wyoming and New Mexico products; this is due to their cleanliness and comparative freedom from soot and also to the high prices of the British Columbia and Australian products which ruled in this market for some time.

Never hook a trolley feeder around a trolley clamp. This practice, common in mines, is a sure source of trouble as they are almost certain to work loose.

Some Coal Statistics for 1911

The volume of coal traffic during the past year, as reported by the leading Eastern coal-carrying railroads, shows but little change from the high figures of the preceding year. The same is not true of the coke movement, which, in sympathy with the curtailment of pig-iron operations, shows a considerable decline.

The anthracite coal shipments from Eastern producing territory aggregated during the past year 69,954,299 long tons, the largest annual total recorded during the past decade, and exceeded by over 5,000,000 long tons the high record of the preceding year. Over 20 per cent. of the total shipped, namely 14,651,441 long tons, was handled in and around New York for shipment to New York proper or to New England destinations. Coastwise shipments of anthracite from Philadelphia during the past year totaled 2,197,750 long tons, while similar shipments from Baltimore are stated as 257,025 long tons. The domestic Lake shipments of anthracite coal during 1911 amounted to 4,374,100 short tons, of which 4,074,383 short tons proceeded from Lake Erie and 254,419 short tons from Lake Ontario ports, the 1911 shipments by Lake showing about the same

Special Correspondence

Some of the more important statistics of fuel production and transportation for the year 1911. The volume of coal handled as a whole shows little change over the previous year. A new high record was established in anthracite, while the coke industry showed a falling off in sympathy with the curtailment in the production of pig-iron.

Note—Excerpts from the "Monthly Summary of Commerce and Finance," including the completed statistics for 1911.

year. The largest relative gain of over 1,000,000 tons is reported by Norfolk, and is due mainly to the increase in tide-water shipments by the Virginian Ry. from its Sewell's Point piers.

The Lake shipments of soft coal for the past year, 17,081,355 short tons, show a considerable shrinkage from the 1910 figures of 18,406,469 short tons. It should be remembered, however, that the demand for soft coal at the upper Lake

STATEMENT OF THE OHIO COAL TRAFFIC ASSOCIATION FOR DECEMBER AND THE YEARS 1910-11 IN SHORT TONS

Railroads	DECEMBER		YEAR	
	1910	1911	1910	1911
Hocking Valley	475,500	315,268	4,777,478	3,621,794
Toledo & Ohio Central	179,336	158,401	2,186,435	1,902,304
Baltimore & Ohio	217,484	181,016	2,455,473	1,828,320
Wheeling & Lake Erie	312,704	321,117	3,771,737	3,674,694
Cleveland, Lorraine & Wheeling	240,856	222,993	3,053,998	3,018,267
Zanesville & Western	156,656	102,568	1,245,103	1,151,434
Toledo Division (Pennsylvania Co.)	262,021	198,255	2,331,160	1,942,145
Lake Erie, Alliance & Wheeling	162,212	113,895	1,328,594	1,256,636
Marietta, Columbus & Cleveland Ry.	4,059	5,772	94,101	30,313
Wabash, Pittsburg Terminal Ry.	1,220	823	63,291	53,920
Kanawha & Michigan Ry.		16,935		121,682
Total	2,012,078	1,637,043	21,307,370	18,601,509

rate of increase as the total and coastwise movements.

The movement of bituminous coal, as reported by 12 leading Eastern coal-carrying roads, totaled 144,623,992 short tons in 1911, as compared with 141,901,097 short tons in 1910 and 122,057,662 short tons in 1909. Coastwise shipments from the five principal Atlantic seaports totaled 26,986,348 long tons in 1911, compared with 25,835,029 long tons in 1910.

Of the total for the year, 10,749,988 long tons are credited to New York, 4,856,626 long tons to Philadelphia, 4,002,809 long tons to Baltimore, 2,678,156 long tons to Newport News, and 4,698,769 long tons to Norfolk, all the ports except Newport News showing larger figures for 1911 than for the preceding

ports in the year 1910 was exceptional, owing to the shortage in the supply of Ohio, Indiana and Illinois coal during part of the year, as the result of the miners' strike. As a matter of fact, the 1911 shipments by far exceed those of any previous year except the year immediately preceding.

The coke movement from the Connells-ville district in 1911 is reported to be 16,334,174 short tons, compared with 18,689,722 short tons shipped in 1910 and 17,785,832 short tons shipped in 1909. The number of active ovens reached its maximum about the second week of April, when out of a total of 39,399 ovens 28,514 were in blast. Since that date the proportion of active ovens has varied between 60 and 70 per cent., being about 68 per cent. at the end of the year.

MOVEMENT OF FUEL ON VARIOUS TRANSPORTATION LINES, 1910-11¹

Railroads	1910	1911
Baltimore & Ohio ²	36,714,732	35,321,771
Buffalo, Rochester & Pittsburgh ³	8,256,501	8,223,617
Buffalo & Susquehanna ³	1,764,637	1,951,256
Chesapeake & Ohio ⁴	15,012,006	14,939,143
Chesapeake & Ohio (Dec.) ⁴	16,247,268	16,488,024
Huntingdon & Broad Top Mountain ³	1,305,801	1,148,675
New York Central & Hudson River ⁴	7,997,871	8,108,738
Norfolk & Western ³	20,096,153	20,954,839
Pennsylvania (east of Pittsburgh & Erie) ³	65,916,840	65,015,701
Pittsburg & Lake Erie ³	17,637,805	16,090,905
Pittsburg, Shawmut & Northern ⁴	1,266,577	1,459,637
Southern ⁴	3,940,451	3,498,537
Virginia ³	1,691,066	2,817,201
Western Maryland	3,231,676	2,673,183
Rivers and Canals	1910	1911
Barren River Lock No. 1	3,092	2,315
Black Warrior River Lock No. 12	5,664	4,342
Canals and Falls at Louisville	896,317	1,378,333
Chesapeake & Delaware Canal	102,319	138,352
Chesapeake & Ohio Canal	190,898	186,440
Davis Island Dam	1,774,760	2,816,975
Green River Lock No. 1	34,137	28,464
Kanawha River	1,229,660	1,317,660
Kentucky River Lock No. 1	66,676	95,862
Monaghela River	9,460,695	9,197,292

¹Figures throughout this table have been reduced to uniform basis of short tons.

²Includes coal received from connecting lines.

³Includes company's coal.

⁴November and 11 months' figures.

⁵Does not include company coal hauled free.

SOUTHWESTERN PRODUCTION, 1909-11

States	1909	1910	1911
Missouri	2,574,873	1,901,967	2,447,477
Kansas	5,779,397	3,328,569	4,823,929
Arkansas	2,090,540	1,437,739	1,495,379
Oklahoma	2,554,566	2,167,014	2,603,762
Total	12,999,374	8,835,289	11,370,547

ATLANTIC COAST DOMESTIC SHIPMENTS, 1910-11, IN LONG TONS

	1910	1911
New York	24,423,062	25,401,389
Philadelphia	6,672,712	7,054,376
Baltimore	4,174,274	4,259,834
Newport News	3,163,798	2,678,156
Norfolk	3,644,561	4,698,769
Total	42,078,407	44,092,524

MONTHLY RECAPITULATION OF DOMESTIC LAKE COAL TRAFFIC, 1910-11, IN SHORT TONS

	Receipts		Shipments	
	1910	1911	1910	1911
Jan.	103,663	57,924	111,396	65,210
Feb.	107,134	92,535	113,437	101,142
Mar.	113,423	42,384	125,336	50,282
Apr.	970,787	490,383	1,385,425	839,843
May	2,408,205	2,327,829	2,741,255	2,652,838
June	3,156,970	2,918,613	3,750,667	3,192,596
July	3,403,591	3,558,441	3,581,569	3,845,321
Aug.	3,219,993	3,382,481	3,475,868	3,645,423
Sept.	2,770,177	2,784,901	3,124,049	3,012,984
Oct.	3,156,462	2,702,841	3,338,916	2,791,513
Nov.	2,676,369	2,363,066	2,808,380	2,652,745
Dec.	483,861	724,256	124,643	298,404
Total	22,570,635	21,445,654	24,680,941	23,148,301

OUR NONCONTIGUOUS POSSESSIONS

The following is a comparative statement of fuel shipments to the noncontiguous territories of the United States for the years 1910-11, in long tons:

	1910	1911
Alaska (coal)	28,659	28,799
Alaska (coke)	174	261
Hawaii (coal)	61,655	1,713
Porto Rico (anthracite)	3,035	2,414
Porto Rico (bituminous)	105,070	101,385
Philippines (bituminous)	118,389	

Current Coal Literature

The Best Thought Culled from Contemporary Technical Journals, Domestic and Foreign

New Safety Catch for Cage

The following is a translation of an article by Guido Nirtl, superintendent of the Austria Shaft III, near Karbitz, Austria, and extracted from the *Zeitschrift des Zentral-Verbandes der Bergbau-Betriebsleiter*.

The idea which led me to the design of my safety catch for cages was to make a mechanism which, in contrast to those at present commonly used, would be en-

$S = 1$ square foot;
 $v = 45$ ft. per sec.;
 so that we get
 $R = 0.000531 \times 1 \times (45)^2$;
 $R = 1.075$ lb. per sq.ft.

A plate which weighs 1.075 lb. per sq.ft. would, therefore, be balanced by the air resistance if it attained a descending speed of 45 ft. per second.

The construction of the safety-catch mechanism is as follows:

It should first be stated that the mech-

anism in the bearings O , these piston rods are so pulled that the pistons hold in compression the buffer spring P in the cylinder, making them press against the cylinder heads.

If now, as already suggested, the hoisting-cage safety catch comes into action through the plate A being raised by the air resistance and brought against the latches B and C , then the piston rods are

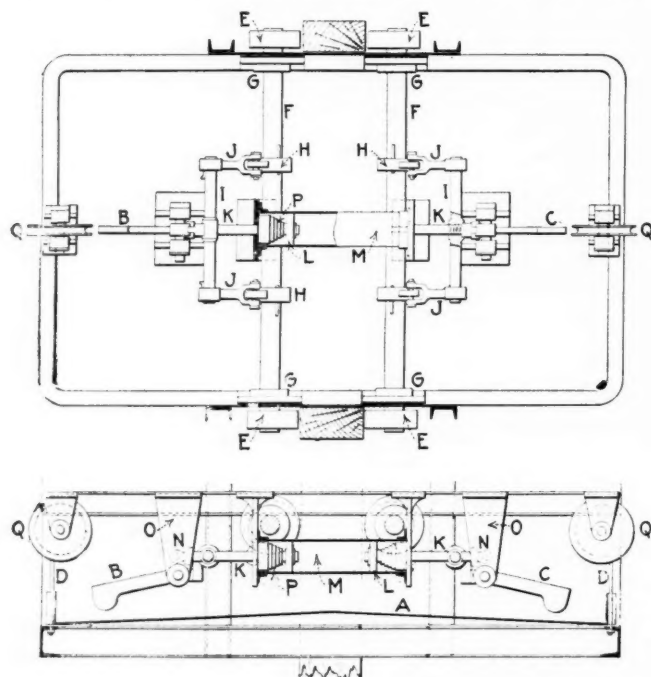
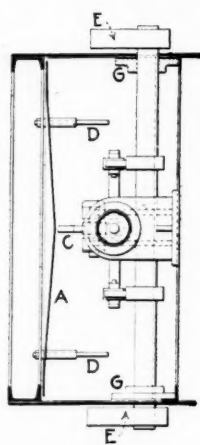
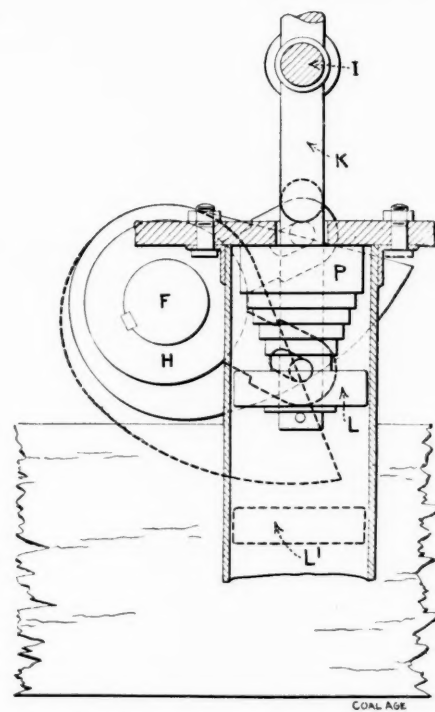


FIG. 1. GENERAL ARRANGEMENT OF SAFETY CATCH



COAL AGE



COAL AGE

FIG. 2. PISTONS AND ECCENTRICS

tirely independent of the hoisting rope, and which would act not only if the rope should break, but also should the cage attain more than a certain maximum velocity in descent. My catch depends on the resistance which the air opposes to a rapidly moving body.

The plate A , lying free at the bottom of the cage, will be raised up when a certain velocity, which can be chosen at leisure, is exceeded. The plate will thus strike against the latches B and C , whereby the springs are released and the catches are made to engage.

The theoretical basis rests on the following calculations: The air resistance in a shaft is

$$R = 0.000531 S v^2$$

in which S is the surface moved in square feet and v the hoisting velocity in feet per sec. at that time. To take a convenient example, I choose:

anism for restraining the fall of the cage is placed not, as is now general, under the roof, but under the cage bottom.

A rectangular frame of channel iron is fast connected to the cage bottom, and on this, the iron plate A lies free, being merely guided when it lifts by the four guide rods D .

Four eccentric catches E are placed outside, below the cage bottom. Each pair is joined by an eccentric rod F , which can turn in the bearings G . On each of the eccentric rods are keyed two crank pieces H , which are linked with the crossheads I by connecting rods J , which are keyed to the crossheads. Through the crossheads pass the piston rods K , which belong to the movable pistons L , traveling in a wrought-iron cylinder M .

The ends of the two piston rods form engaging blocks N by which, through the latches B and C , which can

unlatched, the pistons thrust together by the liberated springs, and the eccentric rods, by reason of their connection with the piston rods, are compelled to turn through a certain angle, whereby the eccentric is made to press into the guides.

The movement of the latches is seen in Fig. 3; that of the pistons and eccentrics in Fig. 2.

The compression of the spring after each action of the safety device is performed by auxiliary cords fastened to the piston rods and passing over the rolls Q , and over similar rolls below the cage roof and connected with the hoisting rope. By the tension of the hoisting rope, the auxiliary ropes are tightened, and with them the springs.

For the regulation of the compression of the springs, the piston rods are connected to the crossheads by a screw thread, the middle part of the crossheads

forming the nuts in which the piston rods can be turned.

The advantages of my construction are as follows:

1. It removes the uncertainty connected with safety catches that are actuated by the breakage of the rope, that is through its relaxation of tension.
2. Joints are avoided, so that a failure to act by reason of foulness is prevented.
3. The springs are inclosed in a cylinder, so that they are protected from external influences, especially dirt.
4. The safety catch consists of two entirely separate halves. If, therefore, through breakage of the spring or other part, one half refuses to act, the other half will nevertheless take hold.
5. The entire construction is simple and easy to inspect, also easy to control, and it can be applied to any existing cage.
6. The prescribed tests of its action can be made simply by bringing the cage down on a post, whereby the bottom plate is raised and the entire mechanism made to act.

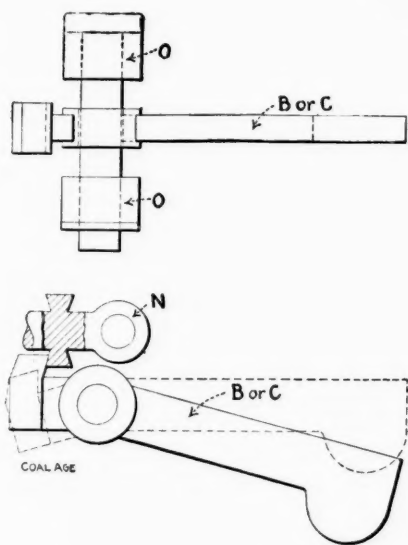


FIG. 3. LATCH MOVEMENT

Plates of different weight can readily be adjusted to the bottom of the cage, so that the speed limit may be suited to varying conditions. Adjustable valves could be placed in the plate A, and by these speed at which it would act might be regulated.

This safety catch of improved design could be used when hoisting men in addition to the ordinary safety catch, so as to provide increased security. When hoisting material, the plate can be fixed by an appropriate appliance, so as to be temporarily out of service. Tests of its principle, which already have been made, have given good results.

The general manufacturing right on this hoisting-cage safety catch has been acquired by the "Erste Brüxer Eisen-gießerei, Kesselschmiede und Maschinen-fabrik in Brüx."

Natural Oil in Coal Mines

When the Yorkshire section of the Society of Chemical Industry held a recent session at Leeds, J. B. Cohen and C. P. Finn read an article on "Paraffins from a Yorkshire Coal Seam," from which we have abstracted the following observations:

"About three years ago, our attention was drawn to a curious oil which dripped from the roof of the Haigh Moor seam, of the Hemsworth collieries. This oil, it was stated, had been running for about seven years, and at one time there was such a quantity that the workmen had been in the habit of using it as a lubricant. It was further stated by the officials who were connected with the colliery before it was sold to its present owners, that when a road was driven through the place mentioned, what they expressively described as 'balls of vaseline,' were found. As the flow at this time (1908) was slow, arrangements were made to collect a supply of the oil, but a fall of roof caused the breakage of the collecting vessels, and as the place had to be timbered up, the opportunity was lost.

OIL OOZED FROM FAULT

"A description of the position where the oil was found will be of interest. The two shafts of the Hemsworth collieries pass through several seams of coal, the principal being the Shafton, Barnsley and Haigh Moor beds. At present only the two last mentioned are being worked, at depths of 1839 ft. and 2058 ft., respectively. A fault is observed in all these seams. Its maximum throw is only 11 ft. The oil was found in the Haigh Moor seam, at a place where the road from the pit bottom crossed the fissure of the fault. This was at a depth of about 2070 ft. from the surface, and in a bed of bluestone bind, part of which contained ironstone bands and was interstratified by a white, soft and permeable sandstone rock. At first sight, it seemed that the oil had an origin in some stratum above the Haigh Moor seam, and that it had come down the fissure of the fault. As it was not found in the Barnsley seam, it possibly came from the strata near or below that bed.

"Early in 1911 it was decided to drive a drift, which would cross this fault in another place. While this was being done, a careful watch was kept for any possible flow of oil. The expectations were fulfilled, and where the drift crossed the line of fault, the surrounding strata were found to be saturated with oil. The oil as it ran out was of a yellow color, but turned a dark brown on exposure to air. No evidence of any natural gas was found.

"Previously recorded instances of oil occurring in the coal beds of Great Britain are few outside of the historic find by Young near Alfreton, in Derbyshire.

Briceville Disaster

Joseph A. Holmes, the director of the Bureau of Mines, addressed the Southern Appalachian Coal Operators' Association, at Knoxville, Tenn., Feb. 13, on "Some Lessons from Recent Mine Disasters." After reviewing the subject of mine accidents in general, in referring to the recent Briceville disaster, he said:

"There should be at every mine or group of mines a sufficient number of men equipped with breathing apparatus, who can begin rescue work in a mine as soon as a disaster occurs, with the expectation of being relieved or aided when other rescuers arrive.

"The more training and experience a miner has in this new type of rescue work, the more efficient he becomes, and the more he can accomplish within a given space of time; and the less is his risk of losing his life. But even after a week's training, such as is given by the government mine-rescue car, a miner should be further trained if he is to take part in the actual rescue work following a mine disaster. Under no ordinary circumstances should a man who has had no previous training in wearing the helmet and its outfit make a trip to a remote part of the mine filled by poisonous gases. This should be done only by men who have already had training for at least a week.

HELMETS OF NO VALUE TO UNTRAINED MEN

"The number of men trained and supplied with modern rescue equipment should be rapidly and greatly increased in every important coal field. It is hoped that within a few years more, this system will be developed to such an extent that should such a disaster occur as that which happened at Briceville, within a few hours after its occurrence there can be assembled on the ground from 50 to 100 men, who are well trained and fully equipped with special breathing apparatus; and who are also fairly familiar with the immediate mining district.

"With a force of this kind it would be possible, within a few hours, to reach all the remote portions of the mine. With the present limited number of trained men in different parts of the country, this is impossible. At no disaster previous to that at Briceville, have we been able to bring together within a short time as many as a dozen experienced and well equipped men. For a short time at Briceville, there were as many as 20 men who had some training in the use of helmets, but one half of these were without experience in actual rescue work, and not one of them was familiar with the mining conditions in that region. A week was therefore required to accomplish results, which should have been accomplished in less than 24 hours."

Who's Who—in Coal Mining

Devoted to Brief Sketches of Prominent Men, Their Work and Ideas

There is one other man who knows as much about mining anthracite coal as does our friend Sam D. Warriner, but I have forgotten his name and can't remember his address. And right here let me remark that "S. D." is a living, forceful, convincing refutation to the popular idea that no man hampered with a university training can carry this burden and at the same time climb the ladder to success.

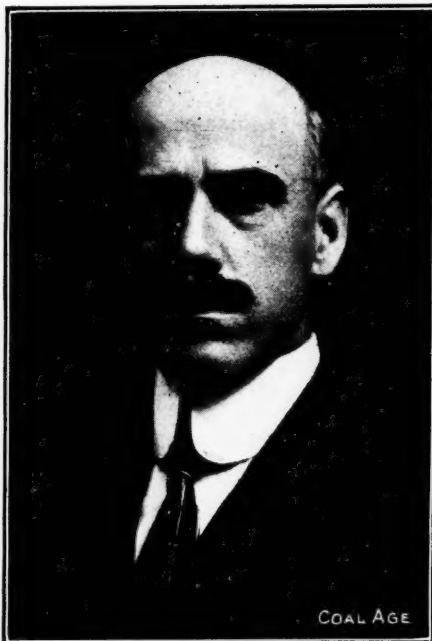
Of course, I don't mean to insinuate that it's as easy for a fellow to succeed when he has been loaded down with a college degree, as when his handicap in the way of an education has extended only as far as elementary algebra in the red school house on the village green. Nor would I have you believe that a sheepskin signed by the president of a great university is equal in value or force to the diploma carefully deposited on your right jaw and bearing the signature of the left hind hoof of a husky pit mule. In truth, it's a fact that some managers owe their running start as well as their later rapid advance to the vigorous reactionary tendencies of an argumentative mine mule.

However, in defiance of revered tradition, and despite adverse odds in the form of a professional training supplied by an indulgent father, who, by the way, was a country minister, Mr. Warriner has measured up to expectations and smashed all time records in getting to the very front of the procession.

Living up to the idea that, "champion once in one thing, champion always in everything," he has pitched curves around the heads of his competitors, just as he used to deliver fadeaways when occupying the box on the Lehigh University ball team. And with "S. D.," this matter of being a champion isn't confined to some specialized line of effort; with him it's wholly a question of season and style. I haven't the slightest doubt but that he would make as good a blacksmith, ping-pong player or ambassador as he is coal-mine manager.

Fancy a sitting of the anthracite conciliation board with Warriner pitching and Richards, of the Reading Company, catching. Can you imagine there would be many base hits on the part of the representatives of the Union? Someone told me a short time ago that the batting average of the miners on the board during the past decade figured out at minus twenty-three.

After graduating at Amherst, Sam Warriner took his E. M. degree at Le-



SAMUEL D. WARRINER

high in '90. No time was lost in useless meditation, and a few weeks later, he was busily occupied mining iron ore down in Virginia. No man is half an engineer today unless he has mined iron ore in Virginia, gold in North Carolina, or coal in California.

"S. D.'s" stay south of the Mason-Dixon line was limited, and before a year had passed he was back in Pennsylvania acting in the capacity of mechanical engineer for the Lehigh Valley Coal Co. Under the tutelage of that "maker of mine managers," W. A. Lathrop, Mr. Warriner advanced rapidly, and before leaving the anthracite field to take charge of development work at the Calumet & Hecla copper mines, in Michigan, he had won recognition as a clever engineer.

The years spent in Northern Michigan with the "C. & H.," furnished Sam Warriner the opportunity to prove his worth. That he discounted and cashed all chances, and at the same time sailed true to the compass, was evidenced by his being called back to Wilkes-Barre, to succeed Mr. Lathrop as general manager of the Lehigh Valley Coal Co.

Some twelve years ago, when Mr. Warriner thus returned to his first love, President Walters, of the Lehigh Valley, said: "As for those coal mines of ours, Sam, if you can only wipe out the annual deficit and split even on the deal, we'll be mighty pleased with the result." Suffice it to say, that last year the coal department of

the Lehigh Valley earned a little more than 100 per cent. on its capitalization, and although the latter is small (\$1,250,000), the progress made in a dozen years is quite remarkable.

I have hesitated all through this little story to start talking about Sam Warriner's head, and I am afraid now if I commence to write on this subject, the remainder of the page will be quickly filled. However, a sketch of "S. D.," without some remarks concerning his "thought factory," would be as incomplete as a picture of Theodore Roosevelt with mouth closed and teeth invisible.

The fellow who first remarked about a long-headed man was looking straight at Samuel. His forehead begins at his eyebrows and ends on the back of his head just above his collar. His thoughts have been so intense and so frequent in recurrence, that only one hair, which the artist has failed to bring out in the accompanying photograph, remains as a silent monument to the fact that other hairs once resided in the same vicinity.

Mr. Warriner's head would be the delight of phrenologists. Nothing could he hide from them when his hat was off, although it's a notorious fact that in everyday life he has been able to hide all things he didn't want the other fellow to know. Of those matters in which "S. D." is proficient, the art of listening is strongest developed, and if "silence is golden" then Samuel is a mint. Years ago he read the proverb, "A Quiet Tongue Shows a Wise Head," and the thought so impressed him, he became chief exponent of the idea in practical life.

Of all Mr. Warriner's opinions, none is more interesting than his belief that welfare work must be cooperative on the part of the company and the men. He says any other plan robs the men of self-respect and creates paupers.

In conclusion, let me say there is one sure way to make "Sam D." speak, and that is to mention the "check-off" system the miners are now demanding. If you think the subject of this sketch lacks in determination, or has any ring in his nose by which he is led, just watch the positive, direct-connected action of his jaws when he replies: "We'll close our mines forever before we agree to any such principle." And even when you have thus touched Sam on this particularly tender spot, his eyes are quiet and a little cold, in no way showing the fire that smoulders underneath. This ability to disguise every feeling is the most noteworthy characteristic of the man.

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This journal has a direct aim—a single purpose—which is to help advance the coal-mining industry. Its creed embodies the dissemination of knowledge and the free interchange of ideas among its readers, all of whom are invited to become regular contributors.

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COAL AGE

What a Strike Will Mean

Should both the anthracite and bituminous operators and miners fail to reach an agreement by April 1 the largest industrial suspension in the history of the country will be precipitated. The anthracite and most of the bituminous agreements expire simultaneously at this time, and approximately half a million men will be immediately affected. Through the curtailment in fuel supplies, and consequent restriction of operations at steam plants generally throughout the country, more than twice this number of men will be indirectly affected in a comparatively short time.

If the labor leaders control the situation to the extent they claim, and there are no reasonable grounds for belief to the contrary, 64.5 per cent. of the productive capacity of the country would be affected. In this estimate is included the entire state of Pennsylvania, with the exception of the Connellsville region, Ohio, Indiana, Illinois, and the Southwestern district, including Missouri, Kansas, Arkansas and Oklahoma. The Central district of Pennsylvania and the state of Iowa are not in the tri-state agreement, and while the former may possibly reach an independent settlement and continue at work, the latter will doubtless be governed by the results of the tri-state convention.

Of the remaining 35.5 per cent. unaffected by the strike, only 23.6 may be regarded as accessible to the markets supplied by the union mines. This includes the Connellsville district, West Virginia, Kentucky, Tennessee and Maryland. In event of urgent demand, some of the Alabama fuel might reach portions of the affected area, but with its total production of only 3.2 per cent. the amount would be negligible. The Rocky Mountain States, with their production of 5.7 per cent. of the country's total, may be regarded as too remote to offer any relief to a shortage in the Eastern markets.

The possibilities of obtaining assistance from foreign countries are *nil*. With the British miners out, and the German pro-

duction seriously curtailed, the European stocks are being depleted, and in any event, sufficient coal could not be transported from those markets to be of material assistance. Local points along the north Atlantic coast will no doubt obtain some relief from Nova Scotia, but with the entire Canadian production equal to only 2 per cent. that of the United States, this will not affect the situation in general.

From this summary it seems fair to assume, as stated, that only 23.6 per cent. of our productive capacity will be available to supply markets with a consumption of 64.5 per cent. Nor can this 23.6 per cent. be regarded as surplus coal since there must already be a natural consumption for it, and only the over-production will be free for use in other markets. In view of the well known and deplorable conditions existing in West Virginia as a direct result of over-production, and the extensive developments recently inaugurated in the Kentucky fields, we venture to assume that, under pressure, this 23.6 per cent. output may be doubled, leaving that amount available for other markets, and reducing our total fuel shortage to 40.9 per cent. What the effect of a forced reduction in fuel consumption of 40 per cent. will be on the industrial world remains to be seen.

From a monetary standpoint, the possibilities are even more alarming. For each working day our fuel production is curtailed 40 per cent. the miners will sustain a loss in wages of eight hundred thousand dollars. On the same basis the value of the product at the mine per working day is one million two hundred thousand dollars. This is the real loss which the industry will sustain if a suspension occurs.

It is not within the scope of this journal to pass judgment on the comparative merits of the issues under contention. But it is within our province to urge upon the contending principals the grave responsibilities of their position and the national importance of their deliberations. Labor has learned an important lesson from syndicated capital with its interlocking di-

rectorates, alliances, etc.—and has, in fact, become syndicated labor, with a latent brute power of passivity no longer denied. And between labor and capital there is a third, and entirely helpless and innocent party, who must eventually pay the enormous bill—the public.

In conclusion, we wish to express the belief that a national coal strike in this country is unlikely. Work in either the anthracite or the bituminous field may be suspended, but the chances of a shut-down in both branches of the industry are remote. The hard-coal operators will never consent to the check-off system demanded by the miners, and, for this and other reasons, it is probable the chief trouble will take place in the anthracite districts.

Coal Mines and Health

Some time ago COAL AGE published a series of articles by Edwin M. Chance, entitled "Pathogenic Mine Atmospheres." Before publication, the title was carefully considered and finally the decision was made that as the caption was a brief of the original title under which the paper thus abstracted was read before the Franklin Institute, it would be well to retain the word "pathogenic" of the original manuscript, using the word in about the same sense, for instance, as it was used by Hahnemann and the original homeopaths.

In former years, the word "pathogenic" lay, in recognized usage, nearer its Greek origins. Later bacteriologic research which has absorbed the brightest thought of modern students of disease has made the word slip its anchor and it is less often used today than formerly to express broadly all forms of the quality of causing suffering. The average present day practitioner would in common parlance limit its reference more specifically to the quality of carrying germs, which have a distressing effect on the human organism. Thus we term the air exhaled by consumptives, the defecations of typhoid patients and the sloughings of those who suffer from small-pox, pathogenic bodies. Many harmful yet germless mediums are not regarded, in the modern sense, as pathogenic at all. They are called poisons, mild or severe. Few would now regard salicylate of soda, for example, as a pathogenic substance. So that viewed from this new standpoint, we would be inclined to state that the mine

atmosphere is not pathogenic. It is rather germicidal as is the drug just mentioned.

It is customary to represent the mines as prejudicial to the health of the miner. We have never been able to accept that dictum in its application to American mines, which are not deep and therefore not warm. The heat of our mines is not sufficient to aid the growth of such germs as will thrive in the blood warmth of the human body. Those impurities which the air contains are usually harmful only as they create in the blood undesirable chemical conditions, or as they dilute that constituent, oxygen, on which the health of the human organism depends. In fact some have suggested that a slight depletion of oxygen has its advantages and may have a marked deleterious effect on certain micro-organisms which have a narrower range of accommodations to atmospheric change than is possessed by man.

The higher altitudes where the density of the air is less than at sea level are favorable to consumptives. Whether the relief they afford is mainly due to the physiologic effects on the patient or to like effects on the patient's deadly enemy, we do not know, nor does it concern us, but if the effect of rarefaction of air on the consumptive depends on the reduction in the oxygen density, we can readily see some justification for those who do not look with disapproval on slight depletions of that constituent.

The miner has always declared the mines unhealthy. Much the same has been said on the dangers of night air. A century past, sea air was also declared extremely unhealthy and the rich recuperated at inland watering places. The rugged health of the sailor might have borne witness to the contrary, just as the miner is a living confutation today of his own ill considered theories. But all evidences were long unheeded; the thrice-breathed indoor air and the heavy air of closed-in valleys were preferred. Yet today nearly everyone sleeps with open windows and crowds of health seekers throng the seaside boardwalks. The time is coming when we shall view the average mine, above sea level, as dangerous indeed to life and limb, but not biologically unfavorable to the happy continuance of life and health in the animal organism.

We have heard almost all hygienic ills, thoughtlessly attributed to the mine wa-

ter, coal dust and the mine atmosphere. An evil looking trinity it must be admitted they make, yet if you attack the coal miner's statement he will nearly always begrudgingly admit that his fellow workers are really not unhealthy and are subject less to rheumatism and consumption, for instance, than men in other occupations. As a matter of fact, hard as it may be to explain, neither of these ills, to both of which one would, *a priori*, expect him to be subject, often afflict the coal miner.

With lungs filled with dust, stooped by shoveling, grievously cramped in undermining, often doubled like a jackknife for eight long hours, the coal miner nevertheless resists consumption well. Working in water, in a continual draft of air, making long tramps from the mines to his home with his clothes frozen stiff over his body, we may be sure that differences of temperature in two adjacent parts of his skin must occur and this thermal inequality is by many thought to be if not the primary at least the accessory cause of rheumatism.

The miner is also subject to frequent skin abrasions. Dirt is an essential part of his toil and this dirt enters his wounds and though in the open air these conditions favor the pus-forming germs, no such results appear to follow in the mines. Not only do trifling abrasions heal without painful complications, but it has been noted by M. J. Shields of the American Red Cross Society, and the conclusion has been fortified by his diligent inquiries, that major accidents with accompanying crushings and mangleings never result in lockjaw unless the injured mine workers are hurt in underground stables.

The air, the coal dust and the water which are the three ills confronting the coal miner are all probably rendered antiseptic by the pyrites in the coal. This pyrites turns to iron sulphate by oxidation, dissolving in water; reactions take place precipitating ferric hydrate and leaving the water impregnated with sulphuric acid. This evaporates slowly and the vapor probably renders the air and coal dust germicidal.

Small quantities of nitrous fumes from some explosives add a trifling amount of nitric acid to the air, though the complete combustion of blasting powder and nitroglycerin does not exhibit such an action, the nitrogen being freed entirely.

Discussion by Readers

Comment, Criticism and Debate upon Previous Articles, and Letters from Practical Men

Shot Firing in Mines

(Continued from March 9)

Letter No. 4—In answer to the question from Seanor, Penn., regarding the disadvantage in the simultaneous firing of shots, I do not believe there is any disadvantage. Also the article on page 642, by W. Hartman, in which he states that electrical firing is more complex and expensive than by the old fuse method, seems exactly opposite to my experience.

In the first place, I have found it far easier, and quicker, to punch a hole in the dynamite, insert the wired detonator, than to peel off the fuse, slip the cap over the end, press it on, and then tie up the package. From a standpoint of cost, it certainly is far cheaper to fire with an electrical detonator than to buy, say, 10 ft. of fuse and a cap, the combined cost of which is far greater than an electric detonator to do the same work.

There may be a remote possibility of danger in the simultaneous firing of shots, providing the charges were extraordinarily heavy. This would be due to the interruption of the ventilating current, the compression and reaction tending to disturb the gas in the gob, and also displace doors, brattices, loose roof, etc., in the same manner as a small explosion.

There are several advantages in simultaneous firing, among which are greater safety to the miner, as he is sure the shots will go off at a certain time, and that there will be no "hang fire" caused by "kinked" fuses.

It is also safer from a standpoint of dust and temperature. If shots are fired in rapid succession, the first makes a certain amount of dust and a certain increase in temperature; the second results in two volumes of dust and two increases in temperature, and the firing goes on until we have dust and heat conditions which are ideal for an explosion.

Shots fired simultaneously perform greater work than when fired separately, that is, their efficiency is increased, and their yield in coal almost double. Therefore fewer drill holes are required, not so much powder, and there is less smoke, time and expense.

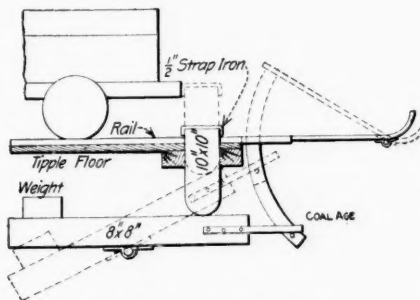
Summing it all up, I am of the opinion that the simultaneous firing of shots has all the advantages, and none of the disadvantages of the fuse and cap system of firing.

R. Z. VIRGIN.

Johnstown, Penn.

A Novel Safety Device for Tipples

I hand you herewith sketch of a stop I have applied to a tippie which I find works satisfactorily and has saved me considerable time and delays by runaway cars striking the sword of the tippie dump. I believe the sketch is self-explanatory.



SKETCH OF CAR STOP

When the dump is in a dumping position, the block is raised so that it will catch the bumpers of the car. When the dump is released to receive another car the block falls back in place. It is not an expensive construction, as it can usually be placed on timbers used for the construction of the tippie. By having the 8x8-in. timber properly balanced it does not interfere with the dump in any way.

G. M. SHOEMAKER,
Mgr., The Virginia-Lee Co., Inc.
Pennington Gap, Va.

Seismic Unrest and Falls of Roof

The editorial on danger periods in mines, in *COAL AGE*, Dec. 16, was highly interesting and recalled some suggestive coincidences in the possible existing relationship between seismic disturbances and coal-mine holocausts, a matter upon which scientists and coal-mining authorities generally are divided.

It would appear that the evidence so far collected is regarded as being not quite sufficiently convincing to convert the entire community to this theory. However, whereas only a few years ago the bare mention of the possibility of such a connection was openly ridiculed, the correlation of certain facts, has resulted in the adherence to the seismic theory by a goodly number of scientists.

There is also reason to believe that not a few mining professors and experts are inclined to accept the view, but it is not openly acknowledged because of the fear of being regarded as faddists by their constituents.

Admittedly the solution of this problem presents many difficulties to the ordinary man, and as colliery people have a way of regarding themselves as eminently practical, "new fangled notions" are looked upon by them with a certain amount of suspicion. There was abundant evidence of this when the coal-dust theory was propounded. Discussion raged furiously and there were not a few departures from friendly relationships. It is interesting to recall that this was less than four decades ago and today the man who doubts the theory is looked upon as old-fashioned and behind the times. Can it be that history may repeat itself in regard to the seismic theory?

There certainly seems to be a fairly general agreement that atmospheric changes and local emissions of gas from the mines have a close relationship, and in Great Britain, barometrical fluctuations are carefully recorded, warnings being periodically issued to mining communities when the conditions presage special danger from outbursts of gas. Beyond this it may be advanced that the theory holding the spasmodic or irregular earth breathings responsible to some extent for explosive conditions in mines, may not after all be wholly unreasonable.

MINE INSPECTORS INSTITUTED INQUIRIES

Mention may be made of the fact that eight years ago the British inspectors of mines instituted inquiries—unfortunately neither uniform nor conclusive—to ascertain whether earth tremors had any tangible effect upon falls of roof in mines. They appear to have taken this course because, notwithstanding the adoption of new special rules to secure systematic timbering, falls of roof and side continued to be as fruitful a source of accident as in the pre-systematic days. Indeed this remark, after the lapse of a number of years, may still be held to apply.

So far as they go the results secured by the mine inspectors may be summarized: W. N. Atkinson selected a period of two months in the year 1902 and observed that 33 earthquakes were registered at the Kew Observatory. Mark-

ing upon a large chart the exact times of 156 accidents from falls in six inspection districts, he says he relinquished his inquiries because "there did not appear to be the slightest indication to coincide, between the times of the earthquakes and those of the accidents."

A diagram was prepared by A. H. Stokes which seemed to indicate that the winter months was the period of the year in which most accidents from falls occur, but he could not convince himself that climatic changes have a material influence upon the death rate therefrom. He was inclined more to the view that the increased time worked in the winter period was responsible for the increased death rate.

Not satisfied with that evidence, John Gerrard sustained the earth-tremors theory, and Henry Hall was severe upon the mine management in the statement of his conclusion that "we suffer from the fact that no very direct responsibility in these cases rests upon any individual officer."

That it was quite possible seismic movement of the earth's crust might be a deep seated and unsuspected cause of many accidents from falls, was admitted by W. H. Pickering. As he remarked, earth tremors, reaching the dignity of earthquakes, pass at times across the British Isles—but hitherto they have never been considered to be a factor in mining accidents.

London, England.

S. T. A.

Vertical Curves to Prevent Derailment

Your readers may be interested in a method of calculating vertical curves that is better known to municipal engineers than to those who follow their profession in the mining fields. Curves of this kind are useful in preventing derailments and save a lot of grading by trial and error, which is too common where a true curve is not predetermined. To make a clear illustration, a somewhat extreme case is taken.

The plane to be built is 520 ft. long. The lower end has a 2 per cent. grade, the upper a 50 per cent. The plane starts at station 0 and the point of intersection of the two grades is 3. The profile drawn has vertical scale $2\frac{1}{2}$ times as large as the horizontal, resulting in a vertical distortion of $2\frac{1}{2}$. The elevations, above tide, of the subgrades at the ends of the plane and at the point of intersection are marked, as is customary, with small flags; the heights of the subgrades, that is, the elevations at which the ties are to be placed, as a result of calculation, are marked on the profile, in the appropriate places, without the use of flags.

To shorten the solution it will be assumed that a break in grade is made every 100 ft., though it would be well to

make the break at intervals of 25 ft. The principle is the same. The point of vertical curve (P. V. C.) is chosen at a distance 200 ft. from the point of vertical intersection (P. V. I.), that is, at station 1. So the projected length of the curve will be 400 ft., the point of vertical tangent (P. V. T.) being at station 5.

Gradient at P. V. C. is 2 per cent., or 2 ft. per station.

Gradient at P. V. T. is 50 per cent., or 50 ft. per station.

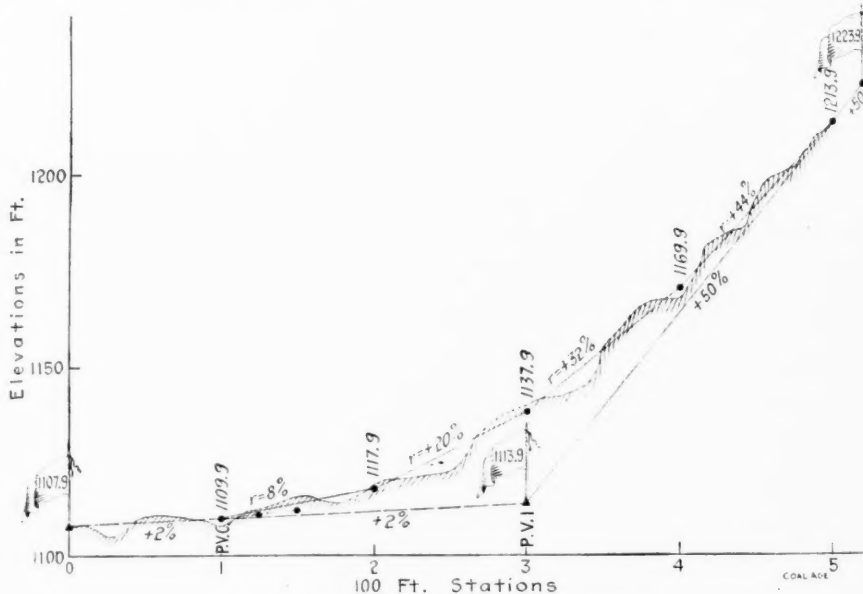
The difference is $d = 48$ ft. per station.

The number of stations covered by curve is $n = 4$.

We obtain a value x from the equation

$$x = \frac{d}{2n} = \frac{48}{8} = 6.$$

Subgrade at P. V. C. = (Subgrade at Sta. 0) + 2 = 1107.9 + 2 = 1109.9.



Proceed as follows, making rise per station = r .

$r = 2$	
$x = 6$	Elev. Sta. 1 = 1109.9
$r = 8$	$r = 8.0$
$2x = 12$	Elev. Sta. 2 = 1117.9
$r = 20$	$r = 20.0$
$2x = 12$	Elev. Sta. 3 = 1137.9
$r = 32$	$r = 32.0$
$2x = 12$	Elev. Sta. 4 = 1169.9
$r = 44$	$r = 44.0$
$x = 6$	Elev. Sta. 5 = 1213.9 Check.
$r = 50$	Check.

This, it will be observed, is exactly the figure given for the P. V. T. If the length of the adopted distance between the breaks of grade is 25 ft. instead of 100:

Gradient at P. V. C. is $\frac{2 \times 25}{100} = 0.5$ ft. per station.

Gradient at P. V. T. is $\frac{50 \times 25}{100} = 12.5$ ft. per station.

Algebraic difference (d) is 12 ft. per station.

The number of stations covered by curve is 16.

We find, therefore, that

$$x = \frac{d}{2n} = \frac{12}{32} = 0.375.$$

The calculation is too long to complete, but commences thus:

$r = 0.5$	
$x = 0.375$	Elev. 1 + 00 = 1109.900
$r = 0.875$	$r = 0.875$
$2x = 0.750$	Elev. 1 + 25 = 1110.775
$r = 1.625$	$r = 1.625$
	Elev. 1 + 50 = 1112.400

It will be observed that the first increase of grade is half the second, just as the first chord in a circular curve makes with the tangent an angle half that which it makes with its neighboring chord.

Such a curve will make derailments unlikely. Where rapid changes of grade take place vertical curves should always be inserted. In return car sidings where empty cars run continually into standing trips, it would be well to figure out vertical curves and to model the grade carefully from the beginning, instead of leaving the matter to adjustment by trial and error. It must be remembered that d is the algebraic difference; if one gradient is up hill and the other down hill, d is the sum of the two gradients per station. By taking only two stations, the apex distance can be easily determined. In this example the stations would be 200 ft. long and d would equal 96; $n = 2$, and $x = 24$. The elevation of the curve at the apex would be 1137.9, as already determined for the same curve with 100-ft. stations.

Indianapolis, Ind.

F. A. BOAG.

Sociological Department

For the Betterment of Living Conditions in Mining Communities

First Aid Methods of Lackawanna Company

By C. E. TOBEY*

There was a time—not many years ago, either—when the poor injured miner was dragged out of the mines by willing, but rough hands; his injured parts were crudely wrapped up with a dirty handkerchief or any old piece of cloth available, such as a discarded pair of

The injured man was carried to his home, sometimes thrown over the shoulder of some strong, robust helper; sometimes two of his fellow workmen would carry him by the head and heels. If there was a saloon on the way it was necessary to stop long enough to drown the poor fellow's pain with rot-gut whiskey, and, incidentally, to furnish, in the same manner, more strength for those carrying him. If the patient survived this kind of treatment and was alive when

as a box containing antiseptic gauzes and bandages, and when a man is injured, word is immediately sent to one or more of these men, and they get to the scene of the accident with all possible haste, and assume charge of the injured. They first make him as comfortable as possible, and then locate the injury. If it should be a broken leg, they immediately rip open the trouser leg to see that no bones are protruding. The fracture is reduced, if possible, and the leg supported and



TRAINED FIRST-AID MEN OF THE D. L. & W. MINING DEPARTMENT

overalls or working pants, and if there were any open cuts or bruises, these were frequently smeared over with fresh quids of chewing tobacco. For in those days chewing tobacco was supposed to have a wonderfully healing effect, regardless of the mouth from which it was extracted. If any of these cuts severed an artery, the man frequently bled to death before a doctor could be procured to stop the flow of his life's blood.

No special care was taken to splint or support a fractured limb so as to prevent further injury, for the average man knew nothing about the danger of fractured bones piercing through the flesh, or how to prevent such an undesirable result.

*Superintendent coal department, D. L. & W. R.R.

Note—Address delivered at Penn. State Y. M. C. A. Convention, Bradford, Penn., on Feb. 23, 1912.

they got him home, it was a question whether he even then got proper surgical and medical attention, as doctors were not as plentiful as they are now and they cost money, and the chances are that some quack heal-all or bone-setter would get hold of the patient and finish him.

D. L. & W. R.R. RESCUE CORPS

Those days are past. Each and every one of the D. L. & W. mines has one or more First Aid Corps, composed of six or eight bright, energetic young men thoroughly drilled and instructed by the best of surgeons in the proper manner of rendering first aid in all kinds of fractures, cuts, bruises, shocks, etc.

These men are equipped with all the necessary paraphernalia to give prompt assistance in time of injury. They have stretchers, splints and blankets, as well

bandaged so as to prevent any further injury in moving the patient.

A FRAME FOR AN INJURED LEG

We have for this purpose in our mine hospitals a frame made of light rod iron, passing down each side of the leg and around the foot, and when the leg is securely bandaged in this frame you could safely throw the patient out of the window without the least possible danger of further injuring that leg. It is not absolutely necessary, however, to have these regular frames, or to delay the work until something of the sort can be procured, as the meaning of "First Aid" is the assistance of the patient and the making of him comfortable with such means as are available until such time as a regular surgeon can be reached, and even a pick or sledge handle can be made to answer the purpose of splint or sup-

port, providing it is properly secured by bandages to the limb. Neither is it necessary to await the arrival of a regular stretcher, as a very comfortable appliance can be improvised quickly by placing two rods or sticks through the sleeves of two or three coats or jumpers.

If there should be any open cuts or wounds to contend with, our First Aid boys are fully alive to the dangers of infection and blood poisoning from the many germs lurking on their dirty hands and clothes. As the Irishman explained to his friend: "Pat, did you ever know that the doctors now claim that all diseases and sickness are caused by a 'bug'? If yez cut off yer thumb and die of lock-jaw, it was a 'bug' that done it. If yez catch cold on yer lungs and ye're carried off by consumption, it was a 'bug' that done it. If yez get hay-fever, it's a 'bug', and if yez has the grippe its another 'bug.' In Germany they call these 'bugs' 'Germs.' In France they be called 'Parasites,' and in Ireland they do call 'em 'Mikerobes'."

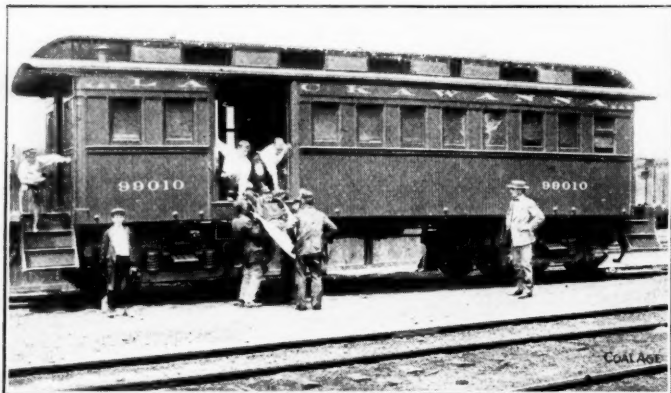
Our men are careful not to touch these cuts or wounds with their hands or dirty clothes, but they use antiseptic gauze, taken from their sealed packets. If an artery has been severed, our men know how and where to place the tourniquet so as to stop the flow of blood and thereby save the man's life. No liquor is given the patient, but if any stimulant is needed, a little aromatic spirits of ammonia is given in water.

ing for us today. Everybody but our superintendent pronounced the man dead, but he would not give up; nor would he allow the others to quit. We had another case in our company hospital where artificial respiration was continuously kept up for five hours, and the patient is still living to tell the story.

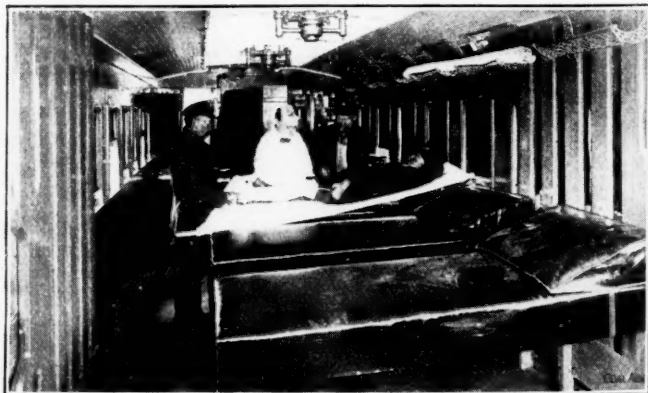
After the injuries have all been prop-



IRON FRAME FOR INJURED LEG



THE HOSPITAL CAR AT KINGSTON, PENN.



THE INTERIOR OF THE KINGSTON CAR

ARTIFICIAL RESPIRATION FOR FIVE LONG HOURS

If the man has been completely "knocked out" and has the appearance of being dead, as is frequently the case in shocks or after-damp, his heart may continue to beat for several minutes after he stops breathing. Artificial respiration is then the only way of restoring life, and when properly done and persisted in, will force the man to breathe whether he wants to or not. We had a case of this kind in one of our mines when artificial respiration was kept up for three-quarters of an hour, and the patient is work-

erly dressed and protected from dirt and contamination, the patient is placed on a stretcher, carefully covered with blankets so as not to get chilled, and hoisted to the surface without any unnecessary jars or jolts.

The ambulance has already been prepared and is in waiting, and the injured man is conveyed on a mattress to the Moses Taylor Hospital, which is in charge of one of the most skillful and capable surgeons in this country. There the patient is left under the watchful eye of a trained nurse, and is not allowed to leave the hospital until all danger is past.

THE HOSPITAL CAR

In our Wilkes Barre district, where the mines are located some 16 or 20 miles distant from the company hospital, we have a regularly equipped hospital car standing at Kingston Station under heat, and ready at a moment's notice to convey injured employees to the Scranton hospital.

If a regular passenger train is due at the time, this car is attached to that train, but if between trains, and the condition of the injured will not warrant delay, a switching engine is immediately attached and the car hurried to Scranton as a special. This car has cots and blankets and everything necessary to the comfort of the injured while being transported, and, if the conditions warrant it, the company surgeon located at Kingston, accompanies the patient to Scranton, and has been known to successfully reduce fractures and perform amputations and other operations while *en route*.

In conjunction with this hospital car we also have a rescue car fully equipped with helmets and rescue appliances, oxygen, etc., and at most of our important mines we have rescue stations similarly equipped and manned by employees thoroughly drilled in the use of these helmets and pulmotors. These men have been confined in sealed rooms filled with sulphur fumes and required to saw timber, shovel coal and dirt, crawl through low

places, carry stretchers over obstructions, etc., while wearing these helmets, and they all have the necessary strength and nerve to enter a burning mine and rescue the men. This car was rushed to the scene of the terrible Pancoast disaster last spring, but, unfortunately, did not get there in time to save any of the 73 unfortunates who lost their lives.

We also have another car located at Kingston fully equipped with all kinds of fire fighting appliances, and, in case of a bad accident or big mine disaster, this special train, consisting of rescue car, fire car and hospital car, is immediately dispatched to the scene.

Inquiries of General Interest

All Questions Must be Accompanied by Name and Address—Not for Publication

Handling a Mine Fire in a Gassy Mine

Referring to the accompanying sketch, which shows a fire started at the face of the intake gangway in a mine, what would be the best method of fighting this fire so as to insure the greatest amount of safety to the men? As shown in the sketch, there are eight chambers driven to the rise of the gangway. In six of these chambers there is gas given off at the face. The direction of the air current is shown by the arrows and it will be noticed that the gas given off at the face of the chambers is being carried toward the fire. This question has caused considerable warm argument here and developed a great diversity of opinion among practical mining men.

ROBERT WILLIAMS.

Wilkes-Barre, Penn.

The first consideration, after withdrawing all men from the mine, is to keep the gas from the fire and to accomplish this before anything else is done the stopping at A should be partly opened. This would short-circuit the air at this point, and the gas being generated at the face of the chambers will be conducted directly into the return airway.

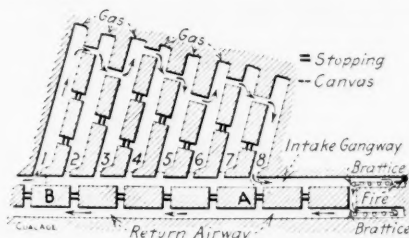
Since there has been, as yet, no explosion of the gas contained in the air current passing over the fire, it may be assumed to be safe to allow this air to circulate past the fire for the present and not to short-circuit the whole of the air current. For this reason the stopping at A should be opened only sufficiently, at first, to reduce the quantity of air passing the fire. Reducing thus the quantity of air will, to some extent, dampen the fire.

The next step is to arrange so as to carry all of the gas-laden air coming from the chambers, through the crosscut at A. This, however, cannot be done with safety until a portion of the intake current entering chamber No. 1 can be conducted through the canvas at B and along the gangway to the fire, so as to dilute the gases formed by the fire, which will rapidly become explosive when the current is reduced. This current will be fresh air containing no gas and will eventually replace the air from the chambers containing gas which is now feeding the fire.

In order to accomplish this it will be necessary to construct a box of sufficient size to conduct the air from the chambers across the gangway to the crosscut at A through which it passes into the return airway. This box can be constructed

quickly by nailing canvas to suitable crossbars in the gangway. This box will form a sort of air bridge, at the roof of the gangway, and is represented by the dotted line drawn from the mouth of chamber No. 8 to the crosscut A. Before constructing this box or air bridge it will be best to open the canvas at B sufficiently to divert a portion of the air passing up the chambers, into the gangway. How much this current can be reduced in the chambers should be determined by a fireboss, who must watch the gas at the face of the chambers, and especially the condition of the current in chamber No. 8.

As soon as the air bridge at crosscut A is completed the air reaching the fire will



SHOWING LOCATION OF FIRE AND DIRECTION OF AIR CURRENT

be practically fresh air containing little or no gas. This current, however, should be only sufficient to allow men to approach close enough to the fire to extinguish the flame, and to avoid the possible formation of an accumulation of explosive gases (carbon monoxide), in the region of the fire.

All of the work should be done with safety lamps and every precaution should be used to protect all approaches to the return airway and prevent anyone from entering the return current. In the meantime, arrangements will have been made to conduct water to the fire.

Ventilating Pressures

If the water-gage reading taken on the fan drift is 2.2 in.; (a) What is the unit of ventilating pressure? (b) What is the mine resistance indicated by this reading if the fan drift, at this point, is 12 ft. wide and 10 ft. high? (c) What is the absolute pressure on the mine air at an elevation of 1000 ft. above sea level?

Fairmont, W. Va.

J. B. W.

The unit of ventilating pressure is

$$p = 5.2 \times 2.2 = 11.44 \text{ lb. per sq.ft.}$$

(b) The area of the fan drift is $10 \times 12 = 120 \text{ sq.ft.}$; and the mine resistance is then

$$R = pa = 11.44 \times 120 = 1372.8 \text{ lb.}$$

(c) The atmospheric pressure, at an elevation of 1000 ft., is 2041.1 lb. per sq.ft., and the unit of ventilating pressure being 11.44 lb. per sq.ft., the absolute pressure is $2041.1 + 11.44 = 2052.54 \text{ lb. per sq.ft.}$

Pumping into Tank

We expect to pump water into a large tank 25 ft. above the ground. Would it be better to run the discharge line or column pipe to the top of the tank where it would have a free discharge, or to enter the pipe at the bottom of the tank? What would be the advantage in either case?

DuBois, Penn.

MINE FOREMAN.

Although, by far, the most common practice is to enter the column pipe and terminate it at the bottom of the tank, this is not the absolute rule, as there are numerous advocates of extending the pipe up the outside and allowing it to discharge into the tank at the top.

Entering the pipe at the bottom reduces the head under which the pump must work when the tank is not full. There is a less length of column pipe to protect from freezing and a corresponding decrease in frictional resistance in pumping. The resistance to discharge at the end of the column pipe is practically the same in either case, whether the pipe discharges into the body of water in the tank or against the atmosphere at the top of the tank.

Pumping in Shaft

The column pipe in a shaft 200 ft. deep is 16 in. in diameter; and all the pumps are arranged to discharge into it. When not required, all the pumps are stopped but one, which has a 2-in. discharge. Would it be better if this pump had its own discharge or column pipe to the surface or will the pump do as well when discharging into the large 16-in. pipe?

MINE SUPERINTENDENT.

Pittsburg, Penn.

It is often the case that pumps arranged to discharge into the same column pipe do not work satisfactorily, when operated together. The fault is due generally to improper design. In the case in hand, the single pump having a 2-in. discharge will work as well or better when discharging alone into the large 16-in. pipe. The pipe friction will be less, for the same flow, than in a pipe of smaller diameter.

Examination Questions

Selected from State Examinations, or Suggested by Correspondents

Questions Asked at Fireboss Examination, Held at Cumberland, Wyo., Jan. 29-31, 1912

(Continued from March 9)

Ques.—What are the dangers attending windy shots and how would you guard against them?

Ans.—A windy shot always produces a large disturbance of the mine air; and, in case dust is present in considerable quantity in the working place, a cloud of dust is raised and a local dust explosion may be produced, the fine dust floating in the air being ignited by the flame of the shot. If, as is often the case, gas has accumulated in the space over the waste or gob, this gas will be ignited and a local explosion produced. A windy shot often loosens the roof at the working face. Where safety lamps are used, the concussion of the air may force the flame of the lamp through the gauze and ignite the gas. The best way to guard against these dangers is to avoid producing a windy shot.

The following precautions are suggested: Avoid an overcharge of powder; drilling the holes too deep on the solid; drilling a "dead hole," by which is meant a hole perpendicular to the face of the coal. Such a hole has no opportunity to work, unless a suitable mining or side cut is made extending nearly or quite to the depth of the hole. Avoid locating a charge too close to a hard roof or near to a boulder. Cut away all projecting tops and bottoms that would prevent the shot from doing its proper work. Avoid firing two or more shots in quick succession in a close place. Never place one shot dependent on the work of a previous shot and fire these two shots at the same time expecting one of them to explode first, the work of the second depending upon that of the first. Where gas is generated always test the face of the chamber for gas before firing a shot. Avoid all accumulation of fine dust and coal, at the working face.

Ques.—What is meant by splitting the air current and what are the advantages of so doing, if any?

Ans.—By splitting is meant dividing the air current into two or more separate currents, each of which will ventilate its own section of the mine from the moment it leaves the main intake until it reaches the main return. By this means the ven-

tilation of the mine is under better control, since the air current can be divided in proportion to the requirements in each section of the mine. Better ventilation is afforded at the working face, since the air is fresher, contains less gas, smoke and dust and travels at a more moderate velocity. Any explosion of gas occurring in one section of the mine is generally confined to that section. A larger quantity of air is circulated by the same power; or for the same quantity of air required the power producing the circulation is reduced. Splitting the air current in a mine reduces the number of doors required, but generally requires the use of regulators and the construction of air-bridges.

Ques.—How would you proceed to clear a shaft that is filled nearly to the top with carbon dioxide, without the use of a fan?

Ans.—In a deep shaft the removal of the blackdamp might prove a difficult operation and in most cases a fan would be needed for that purpose. Assuming, however, a shallow shaft and barring the use of a fan, recourse must be had to such simple methods as the emptying of several barrels of water into the shaft, in quick succession; the use of large bailing buckets lowered and hoisted rapidly; the use of a steam jet or blower at or near the bottom of the shaft. If there is a partition or manway extending down one side of the shaft, advantage can often be taken of the wind pressure by erecting a canvas or cowl, so as to deflect the surface wind into the shaft. It will, however, generally be difficult to remove a large volume of blackdamp from the shaft without the use of a fan, the employment of which would save much time and expense.

Ques.—How would you remove an accumulation of gas from a mine, with safety?

Ans.—Everything will depend on the character of the gas, its location in the mine and the strength of the air current. Assuming, however, a body of marsh gas (CH_4) accumulated at the head of a steep pitch, which is the probable meaning of the question: First, notify the men on the return of the air current and, if the body of gas is large, withdraw all the men from the mine before attempting its removal. Having done this and having stationed reliable men at all points necessary to protect the return airway and prevent persons from entering the same, increase the quantity of air passing in the

affected portion of the mine, as much as possible. Then, having brought the air in sufficient volume to the foot of the pitch and having the necessary material at hand, proceed to erect a temporary brattice, to conduct the air current up one side of the chamber, allowing it to return down the pitch, on the other side of the brattice. Only safety lamps must be used and the work must all be done on the intake side of the brattice. Sufficient time must be allowed for the air current to sweep away the gas each time that the brattice is extended; the work is necessarily slow. All lamps should be kept at a safe distance back from the ends of the brattice. In this manner, the work should be extended up the pitch until the face is reached and the gas removed.

Ques.—If you were about to examine a mine for explosive gas, what would you consider your first duty as a fireboss before you entered on your rounds through the mine?

Ans.—Having filled and properly cleaned his safety lamp, the fireboss, before entering the mine, should ascertain that the ventilator is running at its usual speed. After lighting and carefully inspecting his lamp, on entering the mine, he should proceed at once to the foot of the downcast shaft, or to the nearest point accessible on the main intake airway; and, here, before proceeding further on his rounds, he should assure himself that the usual quantity of air is passing in the airway. In a very gassy mine or where the mining laws or mine regulations require, the fireboss should place a suitable danger signal at the mine entrance, which will remain there as a warning to all persons not to enter until he has returned from his examination and removed the signal. Before examining a gassy mine it is well, if the fireboss is able to do so, to make a special test of his lamp before entering the mine.

Ques.—If it is found necessary to increase the quantity of air in a mine, how would you do it without increasing the speed of the fan?

Ans.—Remove all obstructions from airways; clean up any roof falls; enlarge all breakthroughs or crosscuts and straighten the airways and shorten the distance the air must travel wherever this is practicable. Split the air current whenever this can be done to advantage or without reducing the velocity of the air current to a point too low to sweep away the gases and provide good ventilation at the working face.

Coal and Coke News

From Our Own Representatives in Various Important Mining Centers

Washington, D. C.

Strong interest is felt in government circles with reference to the British coal strike and its reflex effects upon our own coal trade. The immediate influence of the strike, as observed here thus far, has been the stimulation of export business. While full figures are not yet available at the statistical offices, it is known that large quantities of coal are being loaded at Atlantic ports for South American and European points which are usually supplied from English mines.

Should it prove possible to avert a coal strike on this side of the water it is believed that a large, and possibly permanent, gain in our foreign business will be secured. This makes it doubly desirable, according to the views entertained here, that there shall be no violent disturbance of existing conditions in our coal industry. Government officials incline to the opinion that, in view of the circumstances, the operators can afford to make some concessions in order to secure for themselves a valuable opportunity to expand their business in this new direction.

It is well understood here, of course, that the bituminous mines of the country have not been in a money-making position for some time, and this fact has been brought out repeatedly during the past few weeks, not only by statements before the Interstate Commerce Commission in connection with pending coal cases, but also in arguments before committees of Congress in connection with various bills under consideration.

Reports received in Washington, are to the effect that a month's supply of coal is already in sight at different points, and that heavy outputs will be maintained from now until the end of the current month, when prevailing wage agreements expire.

Altogether, the coal situation is regarded here with considerable anxiety and a good deal of attention is being paid to it in Congress. While it is believed that an agreement will be reached on some basis through the submission of modified demands by either side, there is not a little anxiety lest some serious dispute should be precipitated. Should difficulties of an acute nature arise, the national government, it is felt here, would almost necessarily intervene, perhaps along the same lines that were followed under the Roosevelt administration, for the purpose of effecting an adjustment.

Such plans are, of course, purely tentative, but the fact that they are being talked of with seriousness is considered decidedly significant.

PROVISION FOR GOVERNMENT COAL BUSINESS

A specially interesting feature of the new Panama Canal bill, so far as the coal trade is concerned, is that portion which is intended to give the President power to sell coal and other supplies to passing vessels. This provision is found in Section 6 of the bill and reads as follows:

The President is also authorized to establish, maintain, and operate dry-docks, repair shops, yards, docks, wharves, warehouses, storehouses, and other necessary facilities and appurtenances for the purpose of providing coal and other materials, labor, repairs and supplies for its own vessels, and, incidentally, for supplying such at reasonable prices to passing vessels, in accordance with appropriations hereby authorized to be made from time to time by Congress as a part of the maintenance and operation of the said canal.

Moneys received in the ordinary course of business from the conduct of said business may be expended and reinvested for such purposes without being covered into the Treasury of the United States; and such moneys are hereby appropriated for such purposes, but all deposits of such funds shall be subject to the provisions of existing law relating to the deposit of other public funds of the United States, and any net profits accruing from such business shall annually be covered into the Treasury of the United States. Monthly reports of such receipts and expenditures shall be made to the President by the persons in charge, and annual reports shall be made to the Congress.

Alabama

Birmingham—The Corona Coal & Iron Co., which L. B. Musgrove and associates have been operating for some years, was recently purchased by Edgar L. Adler of Birmingham, the price paid for the corporation and its physical holdings being approximately \$1,000,000. The property includes about 45,000 acres of the Corona seam, which is a high grade domestic coal. The new owner expects to spend about \$250,000 in betterments to the present equipment and for new openings, in an effort to produce 1,000,000 tons of coal annually. Heretofore about 500,000 tons have been obtained each year. The plants now in operation include the Corona, Coal Valley and Patten mines.

The bee-hive coke ovens of the Tennessee Coal, Iron & R.R. Co. at Bessemer

and at Alice Furnace, Birmingham, have been put out of commission by the firing of the first battery of the company's new Koppers byproduct ovens at Corey. Other bee-hive ovens will be shut down as the balance of the new plant is finished, during the next few months.

Colorado

Meeker—A contract has been awarded for the immediate construction of a railroad from Rifle to Harvey Gap, which will tap the coal beds at the latter point. This line is being built by the Garfield Coal Co. and will open up deposits of coal that are among the largest in the state.

Denver—By an agreement entered into, Mar. 5, between officials of District No. 15, United Mine Workers of America, and the American Fuel Co., the strike in the Northern coal fields, which has been in progress for nearly two years, is virtually settled so far as the eight mines of this company are concerned. As a result, about 300 men have returned to work in Louisville and Lafayette and it is reported that nearly 1000 will return to work in the Northern field before long. Under the agreement, the men are given an increase of 3c. a ton on the run-of-mine coal and of 5 per cent. on day work. They asked for an increase of 5.55 per cent. on all work.

Fort Collins—The proposed development of a coal mine at Fort Collins has fallen through for lack of funds needed to purchase the property. Outside capital refused to invest in the company and it was compelled to relinquish its holdings.

Illinois

Chicago—Announcement was made recently that the Chicago & Eastern Illinois R.R. had purchased approximately 28,000 acres of coal land in Montgomery County, Illinois, for \$2,500,000. This is regarded as the largest coal-land deal negotiated in Illinois for a number of years. The property was sold by A. R. Bird & Sons of St. Louis and the transfer was handled by the banking firm of Kuhn, Loeb & Co. of New York. The new acquisition increases the coal-land holdings of the Chicago and Eastern Illinois road to 38,000 acres. The purchase represents five mines. The railroad, however, will not operate these but will continue the present leases for a number of years. The property was acquired in order to in-

sure and safeguard the railroad's fuel supply, according to a statement made by the president of the company.

Representatives of the coal operators of western Pennsylvania, Ohio, Indiana and Illinois met with representatives of the United Mine Workers in Chicago, Mar. 5, and arranged for a conference of the joint scale committee to take place in Cleveland Mar. 20. Briefly, the demands of the miners are that the present working day of eight hours be decreased to seven hours, with five hours on Saturday at full pay, and a 10 per cent increase of the present wage scale.

Duquoin—The Chicago and Carbondale coal mine, at Ward has been taken over by the Mississippi Valley Mining Co. for a consideration of \$75,000 and is now in operation. The town of Ward was almost depopulated on account of this mine not working during the past year. The mine had filled with water and was generally run down but the work of reclaiming has been going on rapidly and it is expected that an output of 500 tons a day will soon be attained.

Centralia—The Junction City mine of the Marion County Coal Co. recently broke its own record by attaining a production of 1800 tons in one day. The mine employs 375 men.

Streator—The Chicago, Williamson and Vermillion Coal Co. is putting down a number of bore holes northeast of here in hopes of locating a bed of coal that will justify opening a new mine. This company's present No. 3 mine, near here, will probably be worked out during the year.

Indiana

Logansport—In order to be prepared for a possible strike of the coal miners of the country, an official of the Wabash railroad recently made arrangements to store here a large quantity of coal for the railroad's use. The Wabash intends to store coal all along the different divisions and at all its terminals.

Terre Haute—Miners are in great demand in this vicinity, some coal companies advertising that they require as many as 80 additional men. A strike or suspension on Apr. 1 is regarded as inevitable and every effort is being made to get out as much coal as possible before that date.

Princeton—The Princeton Coal Company's mine, here, has been sold to the Deep Vein Coal Co., of Terre Haute.

Brazil—The Clay County board of mine examiners has secured an opinion from Attorney-General Honan, holding that the examining boards established by the last general assembly cannot legally issue certificates to mine workers except at the regular meetings of the board. In regard to apprentices, Mr. Honan holds that an apprentice must work under a

qualified miner for two years and cannot legally be employed elsewhere in preparation for a certificate.

Indiana coal operators have sent a petition to the Indiana railway commission asking for secrecy regarding their daily reports to the commission which give the number of cars received and loaded, and the number of hours of work at each mine. The order requiring the reports to be made provides that they shall be made public property. The operators say that under the order, coal brokers are enabled to keep in touch with conditions at the mines, and, on that knowledge, often take advantage of shortages in cars or shutdowns to interfere with the sale of coal by the operators.

Iowa

Des Moines—A recent strike at the Ray coal mine southwest of here, originating in differences with regard to the double work system employed at the mine, was soon settled by an amicable agreement. It is said that there is not an idle miner in the Iowa fields at this time, unless it is because of accident or other special reason. The maximum amount of coal is being mined daily in order to store away as much fuel as possible. Operators estimate that in case the miners suspend work Apr. 1, there will not be enough coal stored away to last more than a month or six weeks.

Kentucky

Louisville—Information from Pikeville is to the effect that Congressman John W. Langley, of the tenth Kentucky district, and Congressman James A. Hughes, of the fifth West Virginia district, will wage a vigorous fight to secure appropriations of \$50,000 each for dams on the Levisa and Tug forks of the Big Sandy River, in the annual rivers appropriation bill of Congress. The War Department, after assisting last year in securing the insertion in the rivers bill of authority for the building of these two dams has now concluded that a resurvey should be made before the projects are pushed to completion. These dams will be of inestimable value to the coal industry in western West Virginia and eastern Kentucky, and a delay of one, two or three years would be a serious matter to mining interests. Messrs. Langley and Hughes, in discussing before the House committee the need of appropriations for these two dams, pointed out that they would be of considerable value in demonstrating the importance of the further development of such projects along the Big Sandy.

Whitesburg—It is believed that a number of new towns will spring up this year in the vicinity of Whitesburg, as a result of the expenditure of millions of dollars in development work by the Con-

solidation Coal Co. and other concerns now active in this field. The Consolidation company has announced that it, alone, will spend \$4,000,000 in development work. Jenkins will have 8000 population by Sept. 1, it is estimated. McRoberts, on Wright's Fork, is growing rapidly, and another town is planned for a point farther down on Boone Creek. Dunham and Burdine are growing fast and the Mineral Development Co., a Philadelphia concern, contemplates building a model mining town along Moore's branch, on a large area owned by the company.

Ohio

New Salem—Fire, Mar. 2, destroyed the large wooden tippie of the Buck Coal Co., just east of here. No water was available for fighting the flames but the fire did not spread from the tippie to surrounding buildings. The mine had been shut down for some time.

Alliance—Subdistricts 4 and 5 of District No. 6, United Mine Workers, held their convention here recently and elected officers but refused to discuss the probabilities of a strike, prior to the conference of higher authorities.

Columbus—The hearing before the Federal Court in Columbus of the suit brought by the Federal Government to compel the dissolution of interests alleged to exist between certain railroads and coal companies was brought to a close recently. During the hearing, several prominent coal men were on the witness stand. In summing up for the prosecution, the representatives of the government claimed that in spite of the defendants' pretense of complying with the anti-trust laws, the competition which existed in the Hocking Valley coal fields previous to 1899, at which time the combination was formed, has never been restored. The government claims that this combination is still in force under cover, and that there has been an attempt to conceal the fact by a juggling of professed ownership among the various units of the big syndicate.

Oklahoma

McAlester—The 445,000 acres of segregated coal and asphalt lands of the Choctaw and Chickasaw nations will be sold to the highest bidders as soon as the departmental regulations can be put into effect and a land office opened in this city.

Pennsylvania

BITUMINOUS

Brownsville—After a strike, lasting about 10 days, which threatened to involve the Crescent and Vigilant mines, the miners at the Chamouni works of the Monongahela River Consolidated Coal & Coke Co. have made a compromise agree-

ment, lasting until Apr. 1, and have returned to work. About 200 men went out on strike as a protest against the use of safety lamps.

McDonald—About 500 men, employed at the Jumbo mine of the Pittsburg Coal Co., went on strike recently, as the result of an order compelling the machine men to use safety lamps. It was reported that the miners at the company's Champion mine, at Sturgeon, would strike also.

Indiana—A large field of coal is now being optioned in the heart of the coal-producing section of Indiana County. There are no openings in the immediate vicinity. Options have been taken a number of times on this field, but for different reasons the deals were never consummated. The field in question separates large holdings, now owned by the Buffalo & Susquehanna Coal Co. and the Rochester & Pittsburg Coal & Iron Co.

Connellsville—Coke production has materially increased during the past week, and a number of idle plants are being put in shape to start up on short notice. Much new business is expected to come this way in the event of a coal strike.

Uniontown—The McKeefry plant has resumed coking operations, after a year's shutdown.

Scottsdale—The Shannon Coke Co., which has been idle for over a year, recently resumed operations by firing 42 ovens.

Fayette City—The Pittsburg & Lake Erie R.R. Co. and the Pittsburg Coal Co. are having a dispute over a right-of-way claimed by the railroad over property owned by the coal company. Recently tracks were laid over the ground of the coal company and later, employees of the coal company removed them. To prevent further work on the part of the railroad, the coal company laid a steam line to the ground in dispute and fitted it out so that a shower of steam can be turned on any invaders.

West Newton—Five hundred and fifty-three acres of Pittsburg-seam coal, in Cross Creek Township, Washington County, were recently sold to Pittsburg interests for \$100 an acre. The purchasing company has already begun the erection of a tippie and installation of machinery.

Pittsburg—Rapid progress is being made on the extension of the Monongahela railroad, being built out of Martin, Penn., and running southward to the Pennsylvania and West Virginia state line. It will be operated by the Pennsylvania and the Pittsburg & Lake Erie railroads and will also connect with the Buckhannon & Northern. The road will open up valuable coal lands in Greene County, Penn., and for this reason the New York Central system has been try-

ing to obtain an entrance into the territory for some years. Forty-five miles of road are now under construction. It is expected that the work will be completed by June.

ANTHRACITE

Scranton—The Delaware, Lackawanna & Western company recently became the owner of the Isaac Felts coal lands, in Taylor, some 120 acres in extent and said to contain several millions of tons of coal. The tract will be worked by the Lackawanna company from its Holden mine.

Although only a month has passed since the breaker of the Connell Anthracite Mining Co., at Bernice, burned to the ground, a temporary structure has been erected in its place, capable of turning out 1250 tons of coal daily.

Members of the district executive board of the United Mine Workers announce that active steps are being taken to build up the ranks of the union throughout the anthracite region. Fifteen national organizers have been ordered into Pennsylvania to round up into the union every man now employed.

Wilkes-Barre—The boiler house of Lance, No. 11, colliery, at Plymouth, was recently destroyed by fire. The breaker and adjoining buildings were in some danger but escaped injury.

Five houses were seriously damaged by a subsidence of the surface over old mine workings, at Plains, near here, Mar. 5, due to an extensive cave-in in old workings of a Delaware & Hudson mine.

Conservative estimates have it that fully 2000 foreigners have already departed from the anthracite region. These men are laborers in most instances, but a number of experienced miners also have started back home.

Pittston—Traffic on the Lehigh Valley cut-off was delayed several hours, Mar. 4, by a cave-in under the tracks at a point near the Butler breaker.

Utah

Salt Lake City—The National Fuel Co. has been organized with \$1,000,000 capital to develop coal deposits in Carbon County. The company has taken over 1000 acres of land, 14 miles west of Helper, Utah, and announces its purpose of constructing a railroad from this tract to Helper, to connect with the Denver and Rio Grande. It is the intention to begin construction this summer.

The American Fuel Co., of Utah, which owns 1000 acres of coal land in Grand County, recently sold \$50,000 worth of stock, and the money accruing from this sale together with that from other sales in process of consummation will be devoted to the construction of a railroad, 5

miles in length, which will connect the company's mines with the main line of the Denver & Rio Grande at Thompsons.

Washington

Palouse—Organization of the Palouse Coal & Oil Co., started last November, was completed recently and officers were elected. The company is capitalized for \$500,000 and has taken over leases on 1500 acres of land formerly held by the Palouse River Coal & Development Co. The reports of C. E. Allen and M. M. Waters, who were employed to examine the property, state that a seam of lignite coal, about 6 ft. thick, has been encountered at a depth of 56 feet.

West Virginia

Kingwood—The Preston County Coal Co., operating at Cascade, W. Va., is crippled through lack of labor. Sufficient men are not available to work the plant to its full capacity. The Elkins Coal Co., operating in the same section, is also handicapped by lack of men.

Fairmont—It is reported that the demand for coal is so great that the Consolidation Coal Co. is trying to buy coal to assist in taking care of English contracts. The English government, to supply its needs, has bought 1,000,000 tons of American coal. Contracts are taking up the output to such an extent that little coal is being sold on new orders.

Wyoming

Sheridan—An unprecedented situation in union labor developed here recently when the operators of the coal properties in which the miners are striking brought suit for damages against the union as a body and attached the strike fund of the miners as a guarantee that when the suit is won there will be property with which to pay the damages. The operators allege a regular contract with the union and say the union broke the contract, thereby preventing the company from shipping coal and causing a heavy loss.

Canada

Merritt, B. C.—An explosion of gas at the Diamond Vale Colliery, Mar. 7, killed seven men and injured two. Twenty men, in all, were in the mine; eleven were rescued from another level than that in which the explosion occurred. The men in No. 3 level, the seat of the trouble, had been working with naked lights, and it is generally believed that they struck a pocket of gas.

Halifax, N. S.—It was recently reported that the Allan shafts of the Acadia Coal Co., at Stellarton, were on fire and that it had been necessary to wall off a considerable section of mine.

Personals

F. R. Wadleigh, fuel engineer and assistant general manager of the Chesapeake & Ohio Coal & Coke Co., recently spent several days in New York on business.

H. C. Thompson, of Winchester, and R. L. Thomas, of Lexington, Ky., who are extensively engaged in coal mining and own large coal properties in eastern Kentucky, have opened an office in the Hernando Building, Lexington.

T. E. Jones has been appointed manager of the Cahaba Coal Co.'s property, at Corydon, Ky. Mr. Jones recently made a trip to the headquarters of the company in Birmingham, Ala., and shortly after he returned, his appointment was announced.

W. L. Carter, general manager and part owner of the Barren Fork Coal Co., Pulaski County, Ky., has been made general manager of the Eagle Coal Co., of Alabama and Tennessee, and will move from Louisville, early this month, to take up his residence in Birmingham, Ala.

J. S. Miller, formerly superintendent of the Shumway mine, of the Rocky Mountain Fuel Co., at McGuire, Colo., has been appointed general manager of the Southern Superior Fuel Co.'s mines, near Walsenburg. Mr. Miller will make his headquarters in Walsenburg, although the main offices of the company are in Denver.

W. K. Robertson, E. K. Upton and C. O. Peterson, of Minneapolis, together with R. S. Waddell, G. H. Hutchinson and E. A. Danz, of St. Paul, all officials and engineers of the Northwestern Fuel Co., recently made an inspection of the company's property, at Superior, Wis., and were entertained by B. A. Galleher, superintendent of the local plant.

Thomas B. Scott, Fred Scott and George Cole Scott, of Richmond, Va., directors of the Bryan Coal Corporation, and W. C. Adams, a prominent engineer of Baltimore, Md., recently made a trip of inspection to the Bryan company's coal property, near Birmingham, Ala., in company with Frank Nelson, Jr., of Birmingham, president of the company.

William Hausemann, until recently chief mechanical engineer of the Sloss-Sheffield Steel & Iron Co., has been appointed mechanical engineer for the Pratt Consolidated Coal Co., of Birmingham, Ala., in charge of all mechanical construction at the Pratt company's numerous operations. Mr. Hausemann assumed his new duties on the first of the month.

James E. Roderick, chief of the Pennsylvania department of mines; W. B. Owens, division superintendent of the Lehigh Valley Coal Co., and Peter O'Donnell, district board member of the United Mine Workers, have been named as a

committee of the Pennsylvania anthracite mine-code commission, to codify in skeleton form the state laws which pertain to the mining of anthracite coal.

H. G. Davis, division superintendent for the Lackawanna company, Kingston, Penn., and president of the Wilkes-Barre District Mining Institute, recently delivered an address before a meeting and banquet of the institute, in which he made the statement that "many mine foremen hold their certificates not from merit but by reason of other influences." This remark has stirred up a local discussion of considerable warmth.

Construction News

Zanesville, Ohio. The Crooksville Coal Co. has increased its capital stock from \$15,000 to \$30,000 to provide for enlargement of its plant.

Grand Rapids, Mich. Breen & Halliday, coal dealers, will build a large trestle and coal-storage bin at their Fifth Ave. yards. The plans contemplate a hoisting outfit for delivering cars over the bins.

Indianapolis, Ind. The W. I. Salee Co. will build a reinforced-concrete and steel overhead coal-storage plant of 10,000 tons capacity on its Cornell Ave. property. The plant will be electrically operated and equipped with screens, wagon scales, etc.

Birmingham, Ala. Edgar L. Adler has purchased the property of the Corona Coal & Iron Co., about 45 miles from Birmingham, and will spend about \$250,000 in development and betterments to the present equipment in order to increase the output to 1,000,000 tons annually.

Industrial Notes

H. R. Setz, who has been chief engineer of the Struthers-Wells Co., of Warren, Penn., for the last two years, has just accepted the position of chief engineer with the Otto Gas Engine Works, of Philadelphia. Mr. Setz was formerly connected with several of the leading American and European gas- and oil-engine manufacturers. His particular attention will be directed toward the development of a complete line of Otto-Diesel engines of the horizontal type.

The C. O. Bartlett & Snow Co., of Cleveland, Ohio, has increased its capitalization to \$500,000 in order to keep pace with its development and the rapid growth of its business. About 25 years ago Mr. C. O. Bartlett, now the company's president and treasurer, laid the foundation of this business. Its operations during the earlier years were the manufacture of general mill machinery. But gradually one line after another has been added, and the volume and importance of the business have increased to such an extent that the company now occupies a prominent position as engineers and manufacturers of all kinds of elevating and conveying machinery, complete coal tipples and coal-handling machinery at the mines and docks and complete coal- and ash-handling equipment in addition to numerous other lines of special machinery for the economical handling of practically all kinds of materials.

Book Review

PROFITS AND WAGES IN THE BRITISH COAL TRADE, 1898-1910. by Thomas Richardson, member of Parliament, and John A. Walbank. Published by N. A. C. C., 34 Grey St., Newcastle-on-Tyne. 4 1/4 x 7; 96 pp., paper cover; 6d. net.

This book flung into the camp of the operator at the eve of a bitter struggle is of no little significance and has been so treated, it having been reviewed by the *Colliery Guardian* and *Engineering* in long editorials. It is an *ex parte* statement.

Let us take an instance from the preface, for the purpose of showing the veracity of these witnesses: "On the general question of the minimum wage it may be pointed out that while the national income increased by £225,000,000 during the 10 years ending with 1910, the share of that which came to the working class in the form of wages was under £6,000,000." Probably these facts are true if the word "British" be placed before "working class," but it must ever be remembered that the greater development of English investment is not in Great Britain but abroad, and the increase in the total wage roll has been appropriately there and not in the British Isles. Should all the increase of income go to the British working man? Rather should not some of it go to the larger body of laborers inhabiting the seven seas? The argument is typically British as it was typically Roman in Rome's decline. Just as "Bread and circuses" were to come from the looting of the Roman provinces, so the comforts of the Britannic proletariat are to come today, not from the earnings of British labor, but from the profits of capital invested the world around. If like agitation continues and British business continues to suffer from competition, it is likely that the wage roll of England will continue to decline as the income of the country rises. The recent social propaganda of Lloyd George is only possible while financed by earnings made in every country under the sun.

It seems that the English mines of the United Kingdom have had to face a decline in price from \$2.19 per ton to \$1.99 since 1907. Why then do these authors take a 13-year average except for the obvious purpose of making a good case?

We cannot believe any argument of profit, no matter how large, nor any proof of starvation, however distressing, can be advanced justifiably in defense of a *minimum wage*. Both indeed may well be good convincing evidence of the equity of a wage increase, when an increased rate for *piece work* is urged. If either can be proved satisfactorily, no question remains but that the duty of capital and its proved advantage is to share up its profits in the one case and to improve the physical being and, thereby, the efficiency of its laboring force in the other.

Coal Trade Reviews

Current Prices of Coal and Coke and Market Conditions in the Important Centers

General Review

The strained condition of the market, as noted in our last issue, continues unrelieved. The preliminary meetings of the operators and miners have been even more discouraging than usual, causing additional anxiety to the consumer, and a further demand for storage coal.

The shortage is most pronounced in the East, particularly at the large distributing centers along the Atlantic coast, where it is being further aggravated by an abnormal demand for bunker coal, because of the general suspension in Europe. Deliveries still continue slow and uncertain at these points, with prices ruling firm or advancing.

Production in the Pittsburgh district is estimated to be double that of last September, when the Lake shipments were at their maximum; prices are very uncertain and the market feverish, due to the acute shortage in the East. The car situation continues to be the predominating feature in Ohio. A number of embargoes declared on the Ohio roads were removed for a time, but soon put in effect again, and transportation is still in a semi-demoralized condition. Much of the West Virginia coal, destined for this market, is being diverted to the bunker trade on the coast, which is unusually heavy.

In the Middle West the market is more quiet and easy, although there is an upward trend in prices at Chicago, especially in the steam line. In the Far West the trade is normal and unchanged.

Boston, Mass.

The Eastern market is in a state of near panic, at least so far as concerns soft coal for spot delivery and in small lots. It is probable that were it not for the large off-shore demand and for the stretching of local bunker contracts due to the British strike, prices on bituminous would be little if any higher than a week ago. For small quantities, however, on cars prices have jumped to new high levels. It is only a question of time when larger buyers will have to follow suit, and if the demand keeps up from abroad there is no telling what prices may be reached. Rumors of panic prices at the Virginia terminals and Philadelphia for April and May shipment are alarming, to say the least.

Deliveries all-rail continue to be slow and uncertain. Most of the operators are positively declining orders for delivery after Apr. 1, and high prices still ob-

tain on coal *en route* to the transfer points. The Boston retailers advanced bituminous from \$4.50 to \$5.25 on Mar. 11, and screenings from \$2.75 to \$3.25. In cities like Providence, Fall River, and Portland, the domestic sizes have also been raised from 50c. to \$1. Ordinary grades of Pennsylvania bituminous advanced sharply f.o.b. Philadelphia early in the week, as high as \$4 having been paid for Eastern shipment.

In anthracite there is little change, except that consumption has further reduced stocks. Receipts are still very small. Domestic sizes have been held in cargoes here for prices as high as \$7@7.25, the net circular being \$5.50 alongside. There is much anxiety over shipments for the rest of March. Current prices are about as follows:

Clearfield, or any ordinary bituminous, f.o.b. Philadelphia	\$3 50@4 00
Clearfield, for shipment, f.o.b. mines	2 10@2 50
Pocahontas, New River, f.o.b. Hampton, Roads	3 75@4 75
Pocahontas, New River, Boston, on cars	5 25@6 00
Pocahontas, New River, Providence, on cars	5 25@5 60

New York

The unsettled conditions, bordering on a panic, still prevail in the New York market. The larger companies are hard pressed to meet their contracts and are making sacrifices in order to do so. The older the customer the more consideration he naturally receives, but as a rule allotments are proportioned directly according to the past requirements of the consumer; some consumers are anxious to anticipate a possible shutdown at the mines and are making requisitions for extra supplies which are being refused.

The anthracite companies are inclined to be noncommittal on the outlook but claim that the situation in their department is approximately normal. The demand is heavy, but this is not unusual for this time of the year and wholesale prices are unchanged. Stocks are thought to be rather below normal and it is doubtful if any are being accumulated.

Prices for bituminous rule high and the better grades are practically unquotable. Spot bituminous is variously quoted at \$3.75@4.50 and \$4@5, with prices fluctuating almost hourly. Supplies of bituminous are believed to be only about 50 per cent. normal for this period.

Philadelphia, Penn.

Apparently it is being taken for granted that there is likely to be trouble at the mines on the first of April, judging from

the preparations that both the steam users and householders are making. Consumers are awaiting with interest the result of the conference between the operators and miners, and in the meantime, are protecting themselves to the best of their ability. Public institutions and factories are not taking any chances, but laying aside all the coal they can get hold of, and judging from the demand, the egg, stove and chestnut users are of the same mind.

All sizes are in great demand, and what little stocks the dealers have are rapidly dwindling away. Pea coal is a scarce article here, and almost any price is being paid for it; as a matter of fact, there is a premium asked on all sizes in the open market, and little offering at that. Dealers who have been in the habit of shopping around for their supplies, are finding a very rough road at the present time, and paying fancy prices for what they do get.

The wholesale market still has its hands full taking care of the business offered. As far as the steam sizes are concerned, it is useless to tender orders, for they are invariably declined. Contracts already taken cover the entire output, and there is no surplus for the open market.

Pittsburg

Bituminous—Mines are operating up to the limit of car supply. A few have full car supply, but in general the mines are not able to operate up to full capacity, and an approximate estimate would be 80 per cent.; this, however, includes all mines in the district. Last September, when estimates were made of the mines operating at 50 to 60 per cent. of capacity, there were some mines entirely idle, which did not enter into the reckoning, and it is estimated that at present the output of the district is double what it was in September, with Lake shipments in full blast.

Prices are extremely irregular, and chiefly so on account of the irregular tide-water demand, prices in that market rising and falling almost hourly. Little Pittsburg district coal is going in that direction, as other districts have a freight advantage. The Pittsburg district market may be roughly quoted at \$1.40 to \$1.50 for mine-run, although sometimes considerably higher prices are bid, and occasionally sales are made at less than \$1.40. Prices for the tidewater market

are much higher, but it must be remembered that there is a freight advantage with some districts, and in addition the tidewater prices are all per gross ton, Pittsburg district coal regularly selling per net ton. For instance, a number of sales of Clearfield coal have been made at \$2 per gross ton, with a freight advantage of 40c. per gross ton over Pittsburg. This price, therefore, would be equivalent to \$1.60 per gross ton, Pittsburg district mine, which is equivalent to \$1.43 per net ton.

We quote the Pittsburg district market approximately as follows, per net ton: Nut, \$1.30@1.40; mine-run, \$1.40@1.50; ¾-in., \$1.50@1.60; 1¼-in., \$1.65@1.75; slack, \$1.10@1.25, per ton at mine, Pittsburg district.

Connellsville Coke—The coke market has undergone a sharp advance, with limited sales. Early last week prompt furnace coke was bringing \$1.85@1.90 but the market stiffened steadily and at the close of the week nothing was available at under \$2, while some odd lots were sold at even higher than this. Total sales were 100 to 150 cars. There has been no negotiating on contract coke as neither buyers nor sellers would be ready to consider contracts at this time. The last quotations on contract furnace coke were \$1.80 to \$1.90. We quote: Prompt furnace, \$2@2.10; prompt foundry, \$2.30@2.50.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ending Mar. 2 at 396,010 tons, an increase of 4757 tons, and shipments at 4521 cars to Pittsburg, 6244 cars to points West and 1125 cars to points East, a total of 11,890 cars, or an increase of 152.

Baltimore, Md.

Not for years has the Baltimore market experienced such activity as was apparent during the past week. Prices went soaring, and the supply of the fuel was by no means equal to the demand. There was an advance of from 25 to 50c. in the price on low-grade coal over that quoted for the previous week, and consumers could not get all they desired then. Last week low-grade fuel was sold at \$1.50 per ton. By the middle of the week just ended, this same fuel sold freely at \$1.75 and \$2 per ton, and buyers were anxious to get it at those figures.

The strike in England has helped the Baltimore market to a great extent. The Consolidation Coal Co. is sending all the coal it can spare to foreign countries which had heretofore been supplied by English companies. The Davis Coal and Coke Co., is now loading 6000 tons of coal at Port Covington in this city for the British Navy. Numerous inquiries have also been received by this company from other sources, and it is believed that these will develop into business. The pos-

sibility of a strike in the organized bituminous fields has also helped the local market as the bituminous consumers are not at all certain that an agreement will be reached between the miners and operators.

In the face of the marked activity in the local market, the Baltimore operators have also had to contend with unfavorable car movements. The railroads have not yet been able to procure their full quota of cars from the West, and as a result the shortage in the East still continues. It is expected, however, that the situation will improve during the coming week.

The coke market still continues quiet. Some little coke is being moved under contract, but spot business is practically at a stand still.

Buffalo, N. Y.

There is a regular split in prices as regards Buffalo and other points in this territory, for it is easy to bring in bituminous from the mines, so that the Buffalo prices are easy while at the same time many other points in this district where there is a shortage are paying almost any price. The market is feverish and unsettled and liable to change at any time. The average dealer is getting hold of all the coal he can and selling it at a fancy price. He is, however, confronted by the extra demand from his regular customers, which is so urgent that there is little surplus.

Prices are pretty nearly unquotable, being nominally \$2.60 for three-quarter, \$2.50 for mine-run and \$2.25 for slack. At the same time the consumer who is short will pay almost any price for a quick supply. In some districts there are mills already shutting down because they are not able to get coal at any price.

The railroads are moving freight faster than they did a month ago, but they have not by any means caught up, the worst of the situation being that there are so many empty cars to return to the mines.

The anthracite situation is not much relieved, except that the consumption is reduced. It will be some time before there is any surplus. The demand is heavy and it is going to be heavier in the Lake trade the coming season than ever before. The anthracite authorities claim that they are not likely to be able to meet the demand in this and the Western territory.

Cleveland, Ohio

Conditions in the past week have been even worse than the week previous, on account of the car shortage, and the situation at the present writing looks serious. Unless a better supply of cars is furnished in the very near future, there certainly will be a coal famine, at least in this district.

A great deal of coal has been shipped from the West Virginia points to this market during the winter, and the dealers are expecting to get the greater part of their supply from that district should the expected strike materialize, but in the past week it has been impossible to get quotations from that section, because of the extraordinary demand to supply ocean liners. The West Virginia operators have been getting prices ranging from \$2 to \$2.25 on mine-run for all the coal they can furnish. The general impression is that should the English miners hold out any length of time, the West Virginia people will not ship coal here when they can obtain such high prices in the foreign markets. While there has not up to the present, been any real suffering, there certainly is great uneasiness for the future.

Prices have advanced in this market from 25 to 50c. per ton on all grades, and are especially strong in slack. There seems to be a varied opinion as to whether a strike will take place, the majority seeming to think it will, while others say that a suspension of two or three weeks will be the result.

Columbus, Ohio

With embargoes on practically all of the railroads running north and west of Toledo, the car situation in Ohio shows little signs of improvement. The congestion at Toledo and other way points is still the worst feature of the coal trade, and it will require a long time to relieve the situation. As a result of this the coal traffic is still in a semi-demoralized condition.

Some headway was recently made at Toledo in clearing away the congestion, and several roads removed the embargo which has been in effect for some time, but within a few days it was again declared. There is believed to be 12,000 cars at least in Toledo for shipment into Michigan and Indiana points, and there is little likelihood of their removal for the time being, at least.

Under these conditions prices have been ruling firm in all grades of coal, and in every Ohio mining district. Spot coal for steam purposes is at a good premium, and the same is true of domestic sizes in certain localities. Only the railroads have been able to store up for a suspension, and manufacturing establishments have had all they can do to get a supply of fuel for their current needs. Mines in most of the Ohio districts have been operated on a 50 to 65 per cent. basis, while at some points they have been compelled to close down entirely for a portion of the past week.

The steam trade is the most active department of the business. Retailers are desiring coal, but their orders in transit are large and they are not placing many new ones at this time.

Retail trade has been rather brisk under the present weather conditions, and dealers have been selling many small orders to tide over consumers. Prices prevailing in Ohio fields are as follows:

<i>Hocking Valley</i>	
Domestic lump.....	\$1 60
1-in.....	1 40
Mine-run.....	1 15
Nut.....	1 15
Nut, pea and slack.....	0 95
Coarse slack.....	0 85
<i>Pittsburgh, No. 8</i>	
1-in.....	\$1 30
Mine-run.....	1 10
Coarse slack.....	1 10
<i>Pomeroy Bend</i>	
Domestic lump.....	\$1 75
1-in.....	1 50
Nut.....	1 30
Mine-run.....	1 5
Nut, pea and slack.....	1 00
Coarse slack.....	1 00
<i>Kanawha</i>	
Domestic lump.....	\$1 50
1-in.....	1 30
Mine-run.....	1 10
Slack.....	0 75

Hampton Roads, Va.

It is impossible to give any standard prices for coal at present writing for it is selling at all kinds of prices, without much regard to quality.

Sales of standard New River and Pocahontas coals have been made at \$2.85 per gross ton f.o.b. Hampton Roads, while the same descriptions have also brought as high as \$4.25. At the present time, it is difficult to get any coal for less than \$3.50 f.o.b. Considerable amounts of high volatile fuels have been sold for ships use and such have brought as high a figure as the standard bunker coals.

Coal is moving fairly well to tidewater over all the railroads, but by far the greater part of it is being applied on contracts and there is little free coal; there is still a shortage of both cars and locomotives. The United States Navy has had great difficulty in obtaining any extra coal and it is rumored that some of the present navy contractors will find themselves in a difficult position when the department asks for new bids. There are now a large number of ships lying off the various coal piers and the situation is growing worse every day.

The prospect of a strike in the anthracite and bituminous fields seems more likely and even if the British miners return to work by the end of next week, it will be a long time before conditions become normal again. The large selling agencies are finding it difficult to decide on the best policy to pursue, whether to refrain from making their usual contracts for the coming contract year, in order to have plenty of free coal and take advantage of the present high prices, or to go on and close contracts for the usual amounts. Bids on the Panama Canal contract will be due before Apr. 1 and the figure at which this contract is let, usually determines, to a large extent, the tidewater price for the coming year.

Charleston, W. Va.

As has been the case for several months the output of coal in this state is governed entirely by the car supply. This shortage continues so pronounced that the mines are in operation only about half the time. The demand for coal is good, and the prices are by no means poor when compared with figures of recent years, but with the railroads suffering from a lack of motive power, and unable to keep the cars in motion, the operators are not getting the benefit of the betterment in prices that they feel they should.

The publication of some of the statistics available as a result of the completion of the report by John Laing, Chief of the Department of Mines in this state, for the year 1911, occasioned much surprise in many quarters. Despite the fact that West Virginia is losing hundreds of thousands of tons of coal in trade, it is the belief of the officials connected with the Mining Department that the output for the coming year will show an increase equal to that of the year just closed.

Nashville, Tenn.

The good cold weather still continues here, which is unusual for this section of the country at this time of the year. The car situation has improved a little, and there is still a big demand for coal, which will probably continue up until Apr. 1. After that time, if there is a suspension of operations in Illinois and Indiana, the nonunion fields in west Kentucky will have more business than they can handle and at a very high price. It is likely that the coming week will see quite a good deal of steam and domestic coal shipped from this field, both into Chicago and St. Louis.

The operators all up and down the system are very bullish. Prices are the same as they have been for the past few weeks, except in screenings, which have advanced from 5c. to 10c. a ton over what they have been for the past three weeks, and indications are that they will be much higher the coming week.

Indianapolis

The production of coal and the sale at the mines at good prices, principally for storage purposes, has been carried on at a rather lively pace during the past week. The big demand has given a good tone to the home market, especially in the steam trade, which has largely offset the weakening due to milder weather and the lessening of the demand for domestic. While this demand is general, it is not, according to reports, as heavy as was the case two years ago.

The car situation, while improved, is not satisfactory. Blockades at terminals and way points have delayed the arrivals at destination, and, as a conse-

quence, their return to the mines. Retail dealers are complaining that coal ordered a month ago has not been delivered and their supply is very low. While the big factories are being cared for, the small consumers are suffering because the retailers cannot get the coal. The former are taking advantage of the situation to store up for the strike or suspension, which everyone seems to believe inevitable. Retail dealers say that the railroads are storing and that this is responsible for the car shortage.

Chicago

There is a strong upward tendency in the market for steam coal as a result of the announcement that a suspension at the mines Apr. 1 is practically certain. There is an indication of weakness in the domestic market, the retailers believing that spring and warm weather are not far distant.

A distinct flurry in the steam market is expected within a short time. Prices have already moved up 10 to 15c. a ton, especially on steam lump and screenings. Smokeless coal is practically off the Chicago market except for those shipments which are made to satisfy contracts. Dealers here would be willing to pay \$1.25 to \$1.35 for smokeless mine-run. Anthracite producers have shipped very little coal into the Western market recently as a result of demands for current needs and storage purposes. There is a strong demand for coke, the supply being short.

Prevailing prices at Chicago are as follows:

<i>Sullivan County:</i>	
Domestic lump.....	\$2 62
Egg.....	2 62
Steam lump.....	\$2 37@2 57
Screenings.....	2 12@2 22
<i>Springfield:</i>	
Domestic lump.....	\$3 05
Steam lump.....	\$2 32@2 42
Mine-run.....	2 12@2 22
Screenings.....	2 07@2 12
<i>Clinton:</i>	
Domestic lump.....	\$2 57
Steam lump.....	\$2 33@2 42
Mine-run.....	2 17@2 27
Screenings.....	2 02@2 12
<i>Pocahontas and New River:</i>	
Mine-run.....	\$3 25@3 55
Lump and egg.....	4 05

Coke—Prices asked for coke are: Connellsville and Wise County, \$4.95; by-product, egg and stove, \$4.95; byproduct nut, \$4.75; gas house, \$4.90@5.

Minneapolis—St. Paul

Although there is a distinct shortage of coal here, prices are not in proportion to those generally prevailing at this time of the year when stocks are so nearly depleted and with the strike problem confronting the trade. Prices in the Twin Cities on steam coal are not very steady as there has been a lot of surplus coal dumped into this market. Steam consumers are not inclined to accept the strike talk and are holding for low prices.

Dock men say there is very little coal on the docks at the present time and not very much chance of getting any from the East before Apr. 1. Experienced Lake men report that navigation on Lake Superior cannot possibly open up until a few days before June 1, which is fully a month later than is generally the case. Anthracite coal is very scarce at the docks and a number of the companies reported "no stock" on the larger sizes in their March 1 circulars. One and three-quarter million tons of the different sizes of anthracite were disposed of by the docks at the head of the lakes during the past year and one well known authority states that there is not more than 20,000 or 30,000 tons on all the docks and a great portion of that is booked for shipment.

Prices at the docks are very good and there is no necessity to cut as they will have no trouble disposing of what little coal is left in stock now.

St. Louis, Mo.

The St. Louis market on all coals is more erratic than it has been for two years. Last Saturday, Standard lump coal sold as high as \$1.85 for 2-in., while Carterville 6-in. was hanging on at from \$1.75 to \$1.85. Standard screenings went to \$1.35, while Carterville screenings were selling at \$1.25. This is largely accounted for by the fact that there is only a limited tonnage of Standard on the market, as the railroads are buying it up, whereas there is considerable Carterville, the railroads refusing to touch this on account of the 15c. higher freight rate.

The dealer trade seems unable to get stocked up on account of the prevailing cold weather, the month of March thus far being one of the most severe in a long time. There is a slight chance that the market will break the latter part of the present week, but it opened strong with everything to indicate that it would remain so. It is almost impossible to get Standard screenings, and nut is out of the question. The washed coal market is exceedingly strong on account of the demand for mine-run.

The market opened Monday about as follows:

<i>Franklin County</i>	
Lump and egg.....	\$2.00@2.25
No. 1 nut.....	2.00@2.15
No. 2 nut.....	1.85@2.00
No. 3 nut.....	1.60@1.75
2-in. screenings.....	1.20@1.25
<i>Carterville</i>	
Lump and egg.....	\$1.85@2.00
No. 1 nut.....	1.75@1.85
No. 2 nut.....	1.65@1.75
No. 3 nut.....	1.45@1.50
Screenings.....	1.15@1.25
Mine-run.....	1.35@1.45
<i>Standard</i>	
6-in. lump.....	\$1.90@2.00
2-in. lump.....	1.75@1.85
Screenings.....	1.20@1.30
<i>Mt. Olive</i>	
3-in. lump.....	\$1.90@2.00
No. 1 nut.....	1.60@1.65
No. 2 nut.....	1.50@1.60

The market is good on anthracite at the circular, and coke is moving freely. There is some smokeless moving in, but not in the volume that it has been in the past.

Portland, Ore.

Winter is now apparently over here and the demand for fuel is accordingly light. Wood has declined until cordwood can now be bought for \$5 per cord, delivered in the city, whereas last fall it was quoted at \$7 and \$7.50. No decline has been noted in coal values, however, but the fact must be considered that at no time during the winter did the price rise above that charged early in the fall. The season has been a dull one for fuel dealers.

San Francisco, Calif.

California has been keeping up its climatic reputation and the weather for the past week has been adverse for the coal men. Apart from kitchen requirements, little coal has been needed to meet domestic wants; consequently the movement has been far from brisk. Heavy rains are expected, however, which will tend to cause an increased demand.

The imports of foreign coal for January comprised 14,690 tons from British Columbia, 9780 tons from Australia, and for February, 11,950 tons from British Columbia and 1620 tons from Australia. Car shipments from the East and Middle West were very light. Dealers had laid in full stocks to meet the winter demand, which did not materialize; consequently they have considerable on hand.

The U. S. Government last year brought into San Francisco 135,000 tons of Pocahontas for navy use, and it is understood that the government has engaged tonnage for about 130,000 tons, for delivery this year. Last week the navy department contracted with a local stevedoring company to discharge the coal at 15½c. per ton of 2240 lb., the department doing the hoisting and taking care of the coal from the ship's hatchways.

Current prices to the trade continue as follows, per long ton:

Wellington (British Columbia)....	\$8.00
Pelane Main (Australia).....	8.00
Eastern	8.50

Production and Transportation Statistics

PENNSYLVANIA RAILROAD CO.

Statement of coal and coke carried on the Pennsylvania R. R. Co.'s lines East of Pittsburg and Erie for the month of January, 1912, in short tons:

Anthracite	1,040,535
Bituminous	3,581,365
Coke	940,931
Total	5,562,831

ANTHRACITE

Shipments of anthracite in February amounted to 5,875,968 tons, as compared

with 5,070,948 tons in February, 1911. This is an increase of 805,020 tons and sets a record for the month of February. The Philadelphia & Reading led in volume of shipments last month with 1,202,536 tons; the Lehigh Valley was second, with 1,083,925. Shipments of the Central Railroad of New Jersey were 785,000 and of the Delaware, Lackawanna & Western 782,699 tons.

Financial Notes

Contract between Lehigh Valley Coal Co. and Lehigh Valley Coal Sales Co. provides for purchase of the coal on usual 65% basis, i.e., at 65% of its market value determined by New York tidewater price.

The Chicago, Indianapolis & Louisville has sold to Redmond & Co. and the Equitable Trust Co., both of New York, \$2,500,000 first mortgage sinking fund 5 per cent. bonds of the Monon Coal Co. The bonds are being offered at 94 and interest.

A letter has been addressed to bond and stock holders of the Sheffield Coal & Iron Co. requesting them to deposit their holdings with the Bankers' Trust Co., pending the submission of a plan of reorganization by a protective committee consisting of James Gayley, Alfred Clifford, August Heckscher, Randall Morgan and W. R. Walker.

The committee for the reorganization of the Pennsylvania Coal & Coke Co. has given notice that, pursuant to the plan and agreement for the reorganization, depositors of certificates who have complied with said plan, are entitled under the terms thereof to receive certificates of stock in the reorganized company known as the Pennsylvania Coal & Coke Corporation.

The Herbert Collieries Corporation, which has its principal offices at 17 Battery Place, New York, and is engaged in mining coal on leased lands in Fayette and Raleigh Counties, W. Va., filed a voluntary petition in bankruptcy giving liabilities of \$224,085 and assets of \$169,898. According to the petition, the company owes the Guaranty Trust Co., of New York, \$75,000, fully secured by leasehold mortgage 6 per cent. 10-year sinking fund gold bonds, H. L. Herbert, New York, \$122,233 and Earle & Russell, New York, \$15,000 for legal services. The assets, the petition states, include leases of mines in West Virginia valued at \$150,000; stock in a mine store at Herberston, W. Va., worth \$10,000 and debts due aggregating \$6598.

The Belleville Savings Bank, as holder, it is stated, of \$14,000 bonds, brought suit in the Circuit Court at Belleville, Ill., to foreclose the mortgage of 1905, under which \$1,100,000 bonds were issued to the Southern Coal & Mining Co., of East St. Louis, Ill. It is alleged that the interest and sinking fund payments are in default and that the business is improvidently handled. An official states that the suit will be opposed on the ground, among others, that the terms of the mortgage require a majority of the bondholders to join in a foreclosure suit, that the company has been unable to meet its interest payments for about a year and a half, but if it were left alone now it would soon be on its feet again, as it has been earning about \$10,000 a month since September, 1911.